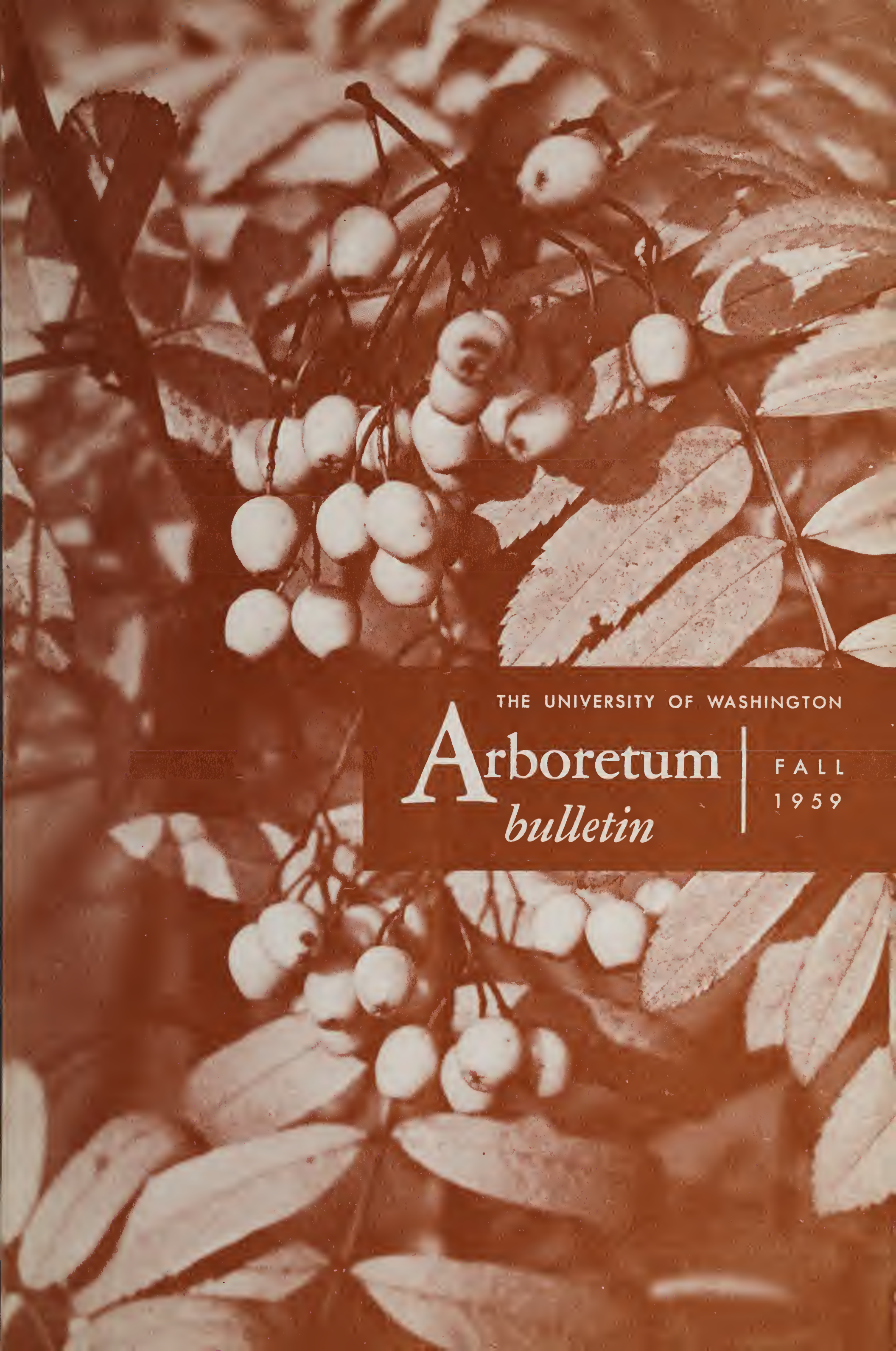

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Arboretum bulletin

FALL
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COVER PHOTO:

Fruits of *Sorbus discolor* on tree in Arboretum.

PHOTO BY: E. F. (WHITIE) MARTEN.

Longwood Gardens—USDA Plant Introduction Program

W. H. Hodge*

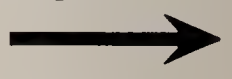
THE introduction of ornamental plants from abroad into our country is something which has been going on since earliest colonial times when colonists imported not only the basic grains, fruits and vegetables needed for sustenance, but also the familiar trees, shrubs and garden flowers of Britain and Europe to decorate their gardens and dwellings.

In the earlier decades most of this plant introduction activity was haphazard, carried on by the new immigrants as they moved into this country, by correspondance with friends back home or through the help of seed merchants or nurserymen. As the years progressed, plant exploration and introduction for ornamentals, as for agricultural materials as well, became more formalized. At the turn of this century such famed institutions as the Arnold Arboretum were sending out plant hunters like E. H. Wilson through whose efforts a number of new though now familiar ornamentals were introduced.

In 1898 our own federal government also formally entered the picture with the formation of a special unit in the Department of Agriculture whose duties included the exploration for and the introduction of new plants. More to the activities of this one unit than to any other in the Department of Agriculture can our farmers and plant breeders be thankful for the remarkable range of crop plant varieties that are grown today so lucratively in America. So successful has this program been during the past half century that its operations have served as a blueprint copied by other nations throughout the world.

Although federal plant explorers have been better known for their agricultural introductions, ornamentals have not been entirely passed by. In the earlier years, especially, men like David Fairchild, Joseph Rock and Frank N. Meyer sent in, among their more numerous agricultural introductions, a number of ornamentals some of which, like the lacebark pine *(Pinus Bungeana),* Siberian elm *(Ulmus pumila),* David's lily *(Lilium Davidii),* and popular Meyer zoysia lawn grass *(Zoysia japonica),* are now widely grown in this country.

Unfortunately, in recent years the continuing need of new or better ornamentals or wild species useful in ornamental breeding programs has been too frequently overlooked. This is not because there are no longer wild or domesticated species, varieties or strains worthy of import as ornamentals, for the fount of ornamentals will certainly yield productively for years to come. Explanations for contemporary lack of support for such programs are not lacking. For one thing, the dangerous consequences of the introduction of new or little-known insects or diseases along with introduced plant material have made quarantine regulations more and more restrictive. Thus it is no longer as easy to bring in new plants, particularly those propagated vegetatively. Nevertheless, foreign plant material required for our dynamic agriculture continues to be introduced, which leads one to point out that the thousands of people interested in this country, either directly or indirectly in ornamentals, are relatively disorganized compared with the growers of crop plants. Yet ornamental horticulture is big business in the United States, but until the lobbying talents of this group can approach those of the agricultural interests, they will find our federal Department



The Australian Snow Gum, *Eucalyptus niphophila,* growing on subalpine slopes near Canberra, A.C.T. This attractive tree, recently introduced, is one of the hardiest eucalypts and has successfully withstood three winters at Longwood Gardens.

FIG. 15 PHOTO BY: W. H. HODGE

*Collaborator, U.S. Department of Agriculture and head of the program of education and research at Longwood Gardens, Kennett Square, Pa. Reprinted by kind permission from the article originally published in the "National Horticulture Magazine," 38, No. 3, (July 1959), at Washington, D.C.

of Agriculture still reticent about increasing funds for ornamental research.

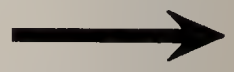
One might logically expect botanic gardens and arboreta to have increasing interest in all phases of ornamental horticulture, including the exploration for and the introduction of new types. Certainly this kind of activity has long been associated with such institutions. Yet, some of these very institutions—in a time of expanding suburban populations with accompanying burgeoning horticultural interests—are content to cut back on the upkeep of their living plant collections in favor of more basic scientific work either in the laboratory or herbarium. Though such basic research is certainly necessary, some phases of it might better be undertaken by our colleges, universities or other research institutions. One might reasonably ask, if botanic gardens and arboreta are to give up their primary public activities of maintaining and displaying living collections of plants, who else is there to carry out this increasingly important function?

It was to help remedy this situation that the Longwood Foundation, Inc., through its subsidiary, Longwood Gardens of Kennett Square, Pennsylvania, helped initiate in 1956 a new sustained program directed solely to the field of exploration and introduction of ornamental plants. This program has been set up as a cooperative one with the United States Department of Agriculture. In this program Longwood Gardens cooperates through grants of funds needed to maintain plant explorers in the field as required. The New Crops Research Branch (a new name for the old Division of Plant Exploration and Introduction of the U. S. Department of Agriculture) with headquarters at Beltsville, Maryland, is the actual action agency charged with implementing the recommended exploratory program.

The plant introduction "know-how" of this unique federal organization encouraged the establishment of the Longwood Gardens—USDA exploration program as a cooperative one. Among benefits obtained are the following: Plant explorers working under this set-up become at least temporarily employees of the U. S. Department of Agriculture and thus when abroad have the advantage of traveling as official representatives of the federal government; all ornamental plant introductions are facilitated entrance through Federal Plant Quarantine which is, of course, a USDA activity; ornamentals entering the country are automatically assigned accession numbers, the familiar plant introduction (or "P.I.") numbers which eventually appear in a permanent printed inventory with worldwide distribution — assurance against future loss of valuable plant collectors' data; finally, the extensive physical facilities (including a chain of federal and state plant introduction stations) and trained personnel of the Federal Plant Introduction organization make it possible to identify, propagate and distribute introduced plants effectively to all interested technical workers at arboreta, botanic gardens, experiment stations and other institutions wherever they may be in this country or abroad. Thus this Longwood Gardens—USDA program should benefit ornamental horticulture throughout America rather than merely one limited horticultural segment, institution or individual.

The early 20th century work by American plant explorers focused attention on bringing together new ornamental plants suitable primarily for the colder parts of the United States. Ornamental explorations specifically beneficial to other regions of the nation have been very few. Accordingly, emphasis of the first explorations has been on these neglected areas. Explorations are planned jointly by a committee made up of members of the two cooperative organizations, but proposals for explorations either by area or by ornamental group are directed to the New Crops Research Branch.

Four distinct explorations for ornamentals have already been completed under this new



An attractive, small, evergreen, red-berried shrub, *Damnacanthus indicus,* recently introduced from the forests of Yakushima, one of the southernmost islands of Japan.

LONGWOOD GARDENS

FIG. 16 PHOTO BY: G. HAMPFLER

cooperative program and a fifth is currently in progress. The first of these, undertaken in 1956 by Dr. John L. Creech, USDA horticulturist, encompassed southern Japan whose warm, temperate climate is similar to parts of southeastern and Gulf coasts of the United States as well as the milder coastal belt of the Pacific Northwest. Collecting in Japan was concentrated in the remote forest regions of the southern part of the archipelago on the islands of Kyushu, Shikoku and lower Honshu. Native to these islands are a number of broad-leaved evergreen species which should add variety to plant materials presently grown in our country. Collections in Japan ranged across the whole field of ornamentals and the introductions brought in include wild species as well as new or little-known selections of cultivars developed in those islands (fig. 16). Among the latter is an outstanding series of new chrysanthemums selected at Japanese chrysanthemum shows, including varieties from the Shinyukyu Imperial Garden at Tokyo.

A second cooperative exploration, made in 1957 by Dr. Frederick G. Meyer, USDA botanist, focused attention on plant collections, both public and private, in southern Europe—France, Spain, Portugal and Italy—but also including Britain. The gardens of these countries are famed for the wealth of their collections which have received the treasures of European plant hunters for years. Certain of these ornamentals have not been successfully or widely established in America. Many should become better known as a result of this second exploration.

The third and fourth explorations were initiated during 1958. The third, which covered the sub-tropical frost-touched states of southeastern Brazil, was undertaken by Dr. Llewelyn Williams, USDA botanist, who concluded his work in the late spring. This trip will yield, it is hoped, showy flowering trees suitable to the climates of Florida and southern California (as well as, of course, to Hawaii and Puerto Rico) where home owners,

(Continued on Page 101)

Plant Introduction by the Arnold Arboretum

DONALD WYMAN*

WHEN the Arnold Arboretum was first established in 1872, it was a worn-out farm, of interesting and varied topography but with merely native trees and shrubs growing in the wooded parts of the area. The idea was present—to grow all the plants that would prove hardy out-of-doors in Boston's rugged climate. After the first arranging of roads and existing plants, seeds and propagating materials were obtained from foreign countries and other parts of America as well. Then as time went on and funds became available, contributions were made to certain groups which were making collecting trips to the hinterlands; finally, our own expeditions, led by E. H. Wilson, Professor C. S. Sargent and others, were financed.

Professor Sargent made an extensive survey of the trees of North America for the Tenth Census of the United States (published in 1883) and this, of course, showed the tremendous wealth of plant material in America. As a result, many of these native plants were obtained for the Arboretum and were started growing here, some of them being introduced to cultivation for the first time by this means. As time went on, more and more plants, cuttings, scions and seeds were brought to the Arnold Arboretum by various means, so that when a tally was made in 1922, it was thought that the Arboretum introduced over 3,000 new woody plants into America, many of them being introduced for the first time into cultivation anywhere.

Records have been kept since that period and hundreds of new species or varieties of woody ornamental plants have been introduced since 1922. However, with increased interest in plant introductions, with far more individuals actively engaged in it, and, what is most important, with transportation from faraway areas now merely a matter of a few hours, it is increasingly difficult to ascertain exactly who is bringing new plants into America and when they are introduced for the first time. The great days of plant exploration in the beginning of the present century are probably over, although new wild plants continue to appear. One outstanding example is the *Metasequoia* which was thought extinct until it was introduced by the Arnold Arboretum in 1948. New plants are still being introduced, although not in as great numbers as they were fifty years ago.

Currently, the Arnold Arboretum and such institutions are continually bringing new plants into the country. They come from hybridizers, nurserymen, and chance "finds" from all the countries of the north temperate regions of the world, although now we are obtaining practically none from Communist countries.

Old estates frequently yield new plants, either as a result of painstaking work done by some devoted gardener or as a result of chance hybridization. Many valued ornamentals have recently come to the fore by this means. One we obtained recently, *Liriodendron tulipifera* 'Contorta', supposedly originated in a garden in Ireland, the owner of which wrote us to describe the new plant. Another, *Malus toringoides* 'Macrocarpa', was grown by a gardener in England from seed he collected in the Arnold Arboretum itself. We now have fine trees of this variety.

Most people are familiar with some aspects of the tremendous amount of hybridization which is now being undertaken by individuals who have knowledge, time, funds, and plant growing space at their disposal. Examples of new plants originating in recent years as the result of a planned hybridizing program in the Arnold Arboretum would be *Forsythia* 'Arnold Dwarf,' *Forsythia* 'Beatrix Farrand', *Malus* 'Blanche Ames', *Malus* 'Henrietta Crosby', and others.

*Horticulturist at Arnold Arboretum, author of several essential books on woody plants, previous contributor to our pages.

New plants are arising also as chance hybrids in the Arboretum, some of which, like *Malus* 'Dorothea,' are being named and introduced. Also, seeds or cuttings collected from faraway places by the Arboretum yield new cultivars worth naming. Such was the situation with some cuttings collected in Central Europe in 1935 from an unusually hardy form of *Buxus sempervirens* found growing in the Vardar Valley section of Yugoslavia. These cuttings resulted in low, flat-topped plants which were unusually hardy in Boston. After several trials elsewhere, this plant was finally named 'Vardar Valley' and distributed in 1957. It has proved most satisfactory and thousands of plants have since been sold.

When the United States Department of Agriculture passed Plant Quarantine Q. 37, it looked as if it would be impossible for any institution but the Department of Agriculture to introduce into the United States certain types of plants such as *Abies, Acer, Berberis, Cedrus, Cytisus, Ilex, Malus, Picea, Pinus, Salix, Ulmus* and others, from certain foreign countries. The restrictions placed on the importation of these plants were so stringent that they were practically prohibited. Since the Department of Agriculture brought in few, a group of arboretums and botanic gardens was organized, headed by the Arnold Arboretum. In 1953, I went to Washington to present our problem to Dr. C. O. Erlanson, Head of the Plant Introduction Section, pointing out to him that none in our group was able to import desired plants from these prohibited genera because we did not have the facilities, nor were such plants being imported by the U.S. Department of Agriculture, for reasons best known to itself.

The final outcome was a splendid cooperative arrangement between this group and the U.S. Department of Agriculture whereby we would order and pay for plants of these restricted genera from the prohibited countries, but they were to be delivered to and grown by the U.S. Department of Agriculture at Glenn Dale, Maryland, during their quarantine period. Later, these plants would be released to the individual arboretum that ordered them, *if* they were released at all.

Eight of the larger botanic gardens entered into this agreement and all the paper work was done by the Arnold Arboretum, through which definite orders were placed. By this means, the Arnold Arboretum has obtained over 200 species and varieties in this so-called "prohibited" category. Some of the plants are new, some were replacements for plants which have apparently disappeared in this country. All were not known to be living in America at the time they were ordered. Other arboretums have brought in another 300 by means of this cooperative venture.

In an effort to "turn up" new plants in America quickly, the Arnold Arboretum has made an offer to the American Horticultural Council and the American Association of

Below:
Magnolia Loebneri 'Merrill' in full bloom at Arnold Arboretum, mid-April, 1955.

FIG. 17 PHOTO BY: ARNOLD ARBORETUM

Botanical Gardens and Arboretums, to act as a "National Registration Center" for all genera of hardy woody ornamental plants not covered in the United States by other Registration Authorities. This is almost a frightening task, since it entails the production and publishing of *international* check lists in most of the genera concerned. This means the searching of publications and catalogues of foreign countries as well as those of the United States, going back a century and more. Work now has been started on several of these international lists of cultivars.

The following list is merely a few of the plants the Arnold Arboretum has introduced over the years. The dates of introduction show that the introduction of ornamental woody plants is still actively continuing, and we hope will continue for many years to come.

A Few New Plant Introductions By the Arnold Arboretum, Past and Present

Abeliophyllum distichum 1924
Acanthopanax Henryi 'Nanus' 1939
Acer griseum 1907
— *Opalus* 1937
— *platanoides* 'Variegatum' 1925
— *pseudo-platanus* 'Prinz Handjery' 1951
Akebia pentaphylla 1949
Albizzia Julibrissin rosea 1919
Aronia melanocarpa 'Wislei' 1951
Berberis Thunbergii 1875
— — 'Argenteo-marginata' 1936
— *verruculosa* 1909
Buddleia alternifolia 1923
— *Davidii magnifica* 1902
Buxus microphylla koreana 1919
— *sempervirens* 'Vardar Valley' 1935
Caragana densa 1927
Cedrus libani (hardy strain) 1903
Celastrus orbiculata major 1920
Chaenomeles lagenaria 'Knaphill Scarlet' 1939
Cornus alba 'Gouchaultii' 1937
— *florida* 'Fastigiata' 1914
— *Kousa chinensis* 1908
Cotoneaster apiculata 1911
— *conspicua* 1937
— *divaricata* 1907
— *racemiflora soongorica* 1910
— *salicifolia floccosa* 1908
Crataegomespilus Dardari 1902
Crataegus crus-galli splendens 1938
Daphne Cneorum alba 1934
Davidia involucrata 1912
Diervilla florida venusta 1904
Euonymus Bungeana semipersistens 1889
— *Fortunei vegeta* 1876
— *nikoensis* 1937
— *europaea* 'Red Cascade' 1952
Forsythia 'Arnold Dwarf' 1942
— 'Beatrix Farrand' 1939
— *intermedia* 'Spectabilis' 1908
— *ovata* 1917
Hamamelis mollis 1902
— *vernalis* 1908
Hibiscus syriacus 'Coelestis' 1923
Ilex yunnanensis 1911
Juniperus chinensis Sargentii 1892
Kolkwitzia amabilis 1907
Ligustrum Chenaultii 1931
— *vulgare densiflorum* 1927
Liriodendron Tulipifera 'Contorta' 1949
Lonicera Korolkowii floribunda 1902
— *Maackii podocarpa* 1907
— *tatarica* 'Arnold Red' 1947
Magnolia Kobus borealis 1876
— *Loebneri* 'Merrill' (fig. 17) 1939
Mahoberberis aquicandidula 1948
— *aquisargentiae* 1948
Malus arnoldiana 1883
— 'Blanche Ames' 1939
— 'Dorothea' 1943
— 'Gloriosa' 1936
— 'Golden Hornet' 1955
— 'Henrietta Crosby' 1939
— 'Henry F. du Pont' 1946
— *hupehensis* 1907
— *Sargentii* 1892
— *toringoides* 1911
— *toringoides* 'Macrocarpa' 1939
Metasequoia glyptostroboides 1948
Pachysandra terminalis 'Variegata' 1925
Phellodendron amurense 1874
Philadelphus 'Belle Etoile' 1925
— 'Dame Blanche' 1926

(Continued on Page 100)

The Seattle Garden Club Lake Washington Ship Canal Planting Project

MRS. PENDLETON MILLER*

SEATTLE has one of the highest concentrations of pleasure craft in the world. The Lake Washington Ship Canal is a unique physical feature connecting our fresh water lakes with the salt water cruising grounds. With the University of Washington and its arboretum at one end and the government locks with their botanical gardens at the salt water terminus, we have every incentive to develop the balance of the waterway to meet these standards. The unsightly portion of the waterway could be transformed into a beautiful and interesting physical asset.

Our first step was to present our proposal at a meeting attended by the local vice presidents of the Northern Pacific Railway Company and Great Northern Railway Company, the chairman of the Allied Arts Commission, representatives of the U. S. Corps of Army Engineers, members of the City Council, the secretary of the City Planning Commission, Superintendent of Parks, Chairman of Parks and Playgrounds Committee of the City Council, City Engineers and a Park Department landscape architect. Thus we were off to a successful start with all the details operating smoothly and falling into place step by step.

The public owned properties are divided in such a manner as to make it difficult and impractical for any one governmental agency to develop their properties independently of each other. With the sponsorship of the Seattle Garden Club and an overall master plan of development as prepared for us by John W. Fischer, landscape architect, the beautification of the Canal can be accomplished.

To date, the following has been achieved.

(a) A comprehensive landscape plan has been prepared and accepted by the City of Seattle and U. S. Corps of Army Engineers.

(b) The overall project has been approved for income tax deduction.

(c) The wholehearted cooperation of public agencies has been secured.

(d) Water maintenance will be provided by the Harbor Patrol fire boats.

(e) A demonstration area (1300 linear feet) has been completed with the cooperation of public agencies and the expenditure of $4,000 in contributions.

(f) The present development will complete the long narrow channel running west from the Fremont Bridge; 6000 linear feet of government property, adjacent to the demonstration area.

(g) When completed, the planting becomes the property of the City of Seattle and the U. S. Government.

(h) The U. S. Army Corps of Engineers has guaranteed maintenance of the project.

The cooperation of public agencies in the work of preparation has lessened our costs by two-thirds, but we will need a minimum of $6,000 to complete the planting and are now soliciting funds for this purpose.

The master plan includes the development of a number of privately owned properties as well. We are soliciting the owners to finance the development of their properties as planned and executed by us, thereby becoming income tax deductible and minimizing expenses on plant material. The reason for this, of course, being the importance of the continuity of the planting in order to achieve harmonious results. The Diesel Oil Sales Company has provided us with a demonstration by financing the execution of our plan on their property.

(Continued on Page 97)

*Mrs. Miller is a member of the Seattle Garden Club Board and Chairman of this interesting project.

Metropolitan Design: Form and Content In Urban Areas

GARRETT ECKBO

We are reprinting, by permission, the major portion of an address given by Mr. Eckbo, one of the leading landscape planners in this country and having an international reputation, to the American Institute of Planners in Seattle, July 28, 1959.

Because of the breadth and wisdom of his ideas, as well as the emphasis on the importance of trees in urban life, we feel that this should receive wide publicity and commend it therefore to the attention of all our readers.

THE heavy construction of urban concentration has produced, in the past, the drive for urban parks as "natural breathing pores" within the naturally ugly city, and in the present the vast scattering to the fresh air and vegetation of the suburbs. Experience indicates that the optimum urban (human) landscape will include balanced and imaginative relations between buildings, trees, streets, ground forms, and all the other elements which complete the landscape. If urbanization is to mean maximum humanization and civilization, rather than mere concentration of construction and commercialism, these balanced relations will include low as well as high buildings, green space as well as paved space, pedestrians as well as vehicles, agriculture as well as industry, sports as well as culture, modest neighborhood scenes as well as vistas, panoramas and landmarks. The basic triangle which connects home, work and recreation in the average citizen's life must be basic to urban design processes. The scenes experienced by most people most of the time are the most important scenes. They should receive the most careful and sensitive attention. We cannot continue to slough them off in routine and sterile patterns, while trying to compensate for this failure by designing special scenes experienced by some people some of the time.

Architectural and landscape design thinks normally in terms of sequence and continuity of spatial and sensory experience; relations between simple, regular and special elements; the repose of unity and the sparkle of variety; small and large spaces, low and high, narrow and wide, long and short, regular and irregular, precise and soft, dark and light, warm and cool, neutral and colorful, simple and complex; the reliability of balance and rhythmic repetition, the stimulation and inspiration of freer, more dynamic and less stable arrangements; the richness of combination and contrast of varying materials, textures, colors and forms. Application of such thinking and feeling, to the urban scene, will come immediately into conflict with the vast sterile over-simplification of the gridiron street block system; with the domination of all circulation routes by motor vehicles, and the consequent loss of pedestrian experience; with the monotonous variety of construction along most streets; with the exaggerated contrasts between formal civic centers and busy downtown commercial areas, large parks and congested housing districts, broad streets and low buildings, vast parking lots and important buildings; with the inexorable tendency of real estate and finance to segregate all neighborhoods by use and economic status, and with many similar forces tending toward sterilization, mechanization, standardization and dehumanization. Reversal of such forces will require concentration on sympathy with the continuity of human experience as much as on rocket ships, geodesic domes and hyperbolic paraboloids.

Trees, rather than architecture, are the best measure of the civilized landscape. A community in which many mature trees survive and more are planted regularly demonstrates a sense of time, history and continuity on the land which is directly contrary to our normal speculative scramble and the normal real estate drive for higher and better use, which regards all free open space as raw land waiting for the magic wand of progress to

touch it. It takes ten years or longer to produce a reasonably mature tree in most parts of the country; few urban land users anticipate a tenure longer than five years. This is not progress, growth, development or dynamics. It is insanity, a squirrel cage in which most of us chase madly round and round only to find the same old ugly city in the end. Those sections of the city in which fine old trees do survive—the better residential districts, institutional grounds, parks—are the showplaces of the city. These are the sections to which the tourists are sent to offset the slums, the blighted areas and the cheap commercial shoestrings.

Tree men spend their lives searching for trees which will accommodate themselves to the impossible conditions of urban living—soot, dust, smog, heat, glare, carbon monoxide, barren dry soil covered with paving, no space in which roots or top can spread or flourish. The ideal urban tree is narrow, neat and inoffensive, somewhat like the ideal urban citizen of these conformist days. Its roots will not push and swell enough to disrupt sidewalks and utilities, its top will not be so broad and dense as to cover signs or windows. It will not drop leaves, twigs, flowers or fruit enough to make a troublesome mess. The natural cycle of growth and decay which produces the rich humus of the forest floor has no place in our centers of civilization.

Trees are nature's air-conditioners. They moderate the climate, reducing extremes of heat, wind, aridity and glare. Likewise they moderate the visual landscape. Most construction can become acceptable in the landscape, both visually and functionally, if it is so spaced that it can be framed and balanced with adequate groups of trees. Rare is the piece of architecture that is self-sufficient without the counterpoint of natural vegetation. Trees are the friends of man. The environment which is good for trees is good for people, and that which is bad for trees is likewise bad for people.

Trees and people should band together against the unwholesome ugliness of most city living. The flight to the suburbs is a symptom of this need. If, instead of forcing trees and people to conform to the demands of today's cities, we were to re-design those cities to conform to the needs of trees and people, the millennium would be here.

Trees range from twenty to one hundred feet in height and spread. Their roots occupy volumes of soil comparable to their foliage volume in the air. They will grow best if the ground within the ultimate perimeter of the top is kept in ground cover, grass or a dry cover which does not seal the surface. Allocation of space adequate for good tree culture should be as much a part of good urban land use planning as the allocation of adequate space for buildings and parking. The five to fifteen foot parking strip is inadequate for most trees and does not justify the excessive maintenance which it requires. While it is well known that trees can be found which will tolerate such restricted situations, when we follow this pattern we fail to obtain the greatest benefit from the material. Architecture, trees and open space are the basic complementary elements of urban design. City planning which does not make possible good architecture, good tree culture, and adequate open space is failing to reach its potential. The city which is not beautiful is not functional, hence is a waste of all the time, energy, labor and materials which went into its construction. City planning must think more specifically and realistically and less diagrammatically, if we are to avoid repeating the mechanized anarchy in which we live today. It is ironic that the richest country in the world, which boasts of its high standard of living, should live in a landscape so poverty-stricken in visual quality. This bears out Galbraith's contention that all our wealth is concentrated in private goods—public facilities are treated as poor orphans.

A new edition of our information leaflet for visitors was published in July, featuring an entirely new map showing more details of principal plantings. Copies may be obtained on request to the Arboretum office ('phone EAst 4-0990).

An Evaluation of Our Eastern Wild Azaleas

HENRY T. SKINNER*

NATIVE azaleas occur in some twenty seven of our eastern states, and between March and August or September a person with the time to spare and a bent for travel can see many millions of these plants in multihued flower. He can seek out the pine woods pink with the Florida Pinxter azalea or carpeted with paler sheets of the Coast azalea, he can find copses and old pastures gay with northern Pinxterbloom, low hillsides snow-covered with the Alabama azalea, mountain slopes afire with the Flame azalea, white-speckled swamps where Sweet or Sticky azaleas have taken over separately or vie with one another for supremacy, or upland bogs lavender-tufted with the little Rhodora. Such mass effects can certainly be beautiful, but what of use in the garden where these plants are seen so rarely? Is there justification for asking how many of these azaleas, as species or as individuals, are seriously good enough to merit garden cultivation?

The answer to the question depends largely upon the gardener. Some gardeners—the collecting type—may be amply satisfied if they have some kind of representative of each of the sixteen-odd eastern species, with a botanical variety or two, mayhap, for especially impressive effect. While such a collection could be of botanical interest it could also be most unexciting, horticulturally. Does this mean that most of these sixteen species are not worth growing? Not at all. It means just this: that in spite of prejudices to the contrary an azalea species, like species of many other plants, is a taxonomic grouping comprising highly variable individuals; that, while in some species the average (and most easily obtained) representative may be of genuine garden merit, in others this average plant may be poor to nondescript from the display standpoint. The problem, of course, is a matter of selection. The best representatives of the better species can be excellent indeed, while the best of the less exciting species need be anything but disappointing. There currently exists a very real difficulty in finding and obtaining these best forms, but this log jam will not long persist because several collectors have made good finds and are beginning to propagate them.

In the meantime, which species are to be recommended, on a basis of forms commercially available? At about the top of the list I would place the Flame azalea, *Rhododendron calendulaceum,* for its hardiness and for its splendid show of large, clear yellow to orange, red or pastel-shaded flowers, borne on bushes up to 10 feet or more in height with a grace that the Exbury hybrids can probably never equal. I am thinking here of *both* Flame azaleas, the especially large-flowered, hairy-leaved, lower elevation, mid-May form, as well as the early-June-flowering and excessively color-variable form from higher elevations of the southern Appalachian mountains. The first will come, usually, from northern collectors, while the second will be stocked by one or two nurseries in the North Carolina mountains. If supplied by McMinnville, Tennessee, collectors the plants will be *R. Bakeri,* not *R. calendulaceum,* because thin flower-tubed (diploid) *Bakeri* is the only red-orange azalea of the nearby Cumberland plateau. This, however, is also an excellent azalea, which is lower growing than the Flame, has smaller, non-hairy and more persistent leaves, more delicate effect and a flowering time of mid-to-late June.

My own interest in native azaleas has been largely concerned with the members of series *Luteum,* which does not include the Pinkshell, *R. Vaseyi.* But for garden value as an early-blossoming and exquisitely modeled miniature of the Japanese Royal azalea, I believe it

*Dr. Skinner, who is Director of the U.S. National Arboretum, has made the native azaleas his special study for a number of years.

would rank next in preference. The washy pinks are the least interesting, but there are good medium to deep pinks as well as the beautiful clear white of LaBar's Nursery's 'White Find.' The foliage is clean and turns bronzy red before falling.

If the Pinkshell ranks high, its closest runner-up is the Roseshell, *R. roseum,* an extremely hardy azalea distributed from the Virginia Blue Ridge to southern Quebec. The flowers, with pointed petals widespread at the base, are more distinctive from the lower end of this range, but the delicious clove-like scent seems general. While the average pink color is entirely pleasing the deeper shades are perhaps to be preferred. With grayish foliage and graceful habit this beautiful plant has only one major fault, its reluctance to be propagated by cuttings.

For uniqueness and for its future usefulness in breeding, late-flowering (July-August) *R. prunifolium,* the apricot to orange-red Plumleaf azalea, will be a garden item from now on. As a relic plant from a small area of Georgia and Alabama it seems, nevertheless, to be relatively hardy and an old, round-topped bush, with its many flowers held more or less upright above the new, fresh green foliage, is certainly attractive. Nearly all clones are decorative, and cuttings root more easily than those of any other orange-red azalea.

In whites we have a choice of six species with several additional forms and variations, which provide an almost continuous flower sequence from late April to September or later. Among all these I would give high score to one medium-early and one late, the early one (early May) being the large-flowered and taller growing *canescens*-influenced phase of yellow-blotched and lemon-scented *R. alabamense,* or, failing this, the Coast azalea, low-growing, stoloniferous *R. atlanticum.* True *R. alabamense* is rather small-flowered, so it is perhaps fortunate that it seems to be the "semi"-hybrid phase which is currently available from a few commercial sources. The quantities of flowers with their rounded clusters can be very showy, to say nothing of the scent for which alone this species is worth growing. Grayish-foliaged, medium low growing and easily propagated, the Coast azalea well be much needed as a breeding parent. It too is well scented but though both graceful and interesting is not quite as showy as the other.

For a late white, and in the absence of specially selected forms, my own choice would be the smooth-stemmed Sweet azalea, *R. arborescens.* The foliage, sometimes gray beneath, is clean and good, the bush tends to be upright and fairly tall and even the average plant has a plentiful supply of reasonably large flowers so long as overhead shade is not too dense.

That is a total of eight species and at least these eight should be rewarding almost regardless of any selecting of planting stocks. In even the best, however, there is a low proportion of off-color, small or squinchy-flowered individuals which would not do much credit to a dog's grave. This proportion tends to mount as we get to some of the remaining species. With selection, however, with choice of the better forms, most of the rest—*R. canescens, nudiflorum, speciosum, austrinum, viscosum,* and so on— fall quickly into the category of entirely worthwhile garden plants.

Beyond the species there are also the natural hybrids of which a limited number are being grown by a few eastern fanciers. For the sake of record the occurrence of natural hybrids is not infrequent within this enormous population of native azaleas but at the same time, except for a few rather well defined geographic areas, the pockets of occurrence are scattered indeed and are probably of very minor significance so far as the immediate future of most existing species is concerned. They are interesting to the gardener, however, and undoubtedly some of the best pink *R. arborescens—Bakeri* and *calendulaceum* hybrids as well as the white, lavender and coral-shaded *R. calendulaceum-nudiflorum* and *roseum* hybrids will find their way into cultivation even though most of them could be produced in even more striking

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American Azaleas in the Arboretum

J. A. Witt

SEATTLE is not truly azalea country. Our springs are too mild and slow of coming, our winters are often too cold for some of the less hardy species and cultivars. We cannot compare, for instance, with the southeastern states which grow vast numbers of these plants, giving them mild winters, quick warm springs and hot, hot summers. Nevertheless many visitors from the "Azalea belt" remark at the varied beauty and number of azaleas which we do grow, and it is not unusual for these same people to be quite ecstatic over some of the showy deciduous forms. "Now I come from Mobile and I've never seen anything like that" is a typical comment heard from a visitor looking at, say, one of the beds of the newer Exbury hybrids. She can scarcely believe it when told that these handsome plants represented the end product of breeding two of the "honeysuckles" native to her mountains with other azaleas from North America and from Japan. A prophet is not without honor . . . yet some of the very best azalea displays in the Arboretum are made up of these native Americans or of their children.

The first, of course, is the soft pink or white flowered Vasey azalea, *Rhododendron Vaseyi,* from the mountains of North Carolina. The flowers, coming as they do in late April or early May on the bare wood, mock and continue the show started by the Japanese royal azalea, *R. Schlippenbachii.* The largest group of the Vasey azaleas is near the picnic tables at the north end of Azalea Way, but other groups are scattered about, with a fine stand of four to five foot tall plants on the bank immediately south of Woodland Garden. As with many of the early spring flowering plants, these beauties have a very long flowering season, often extending from late April to late May.

May is the month of azaleas, with the American species no exception. Mid-May will find a wide range of them flowering along Azalea Way. Very near the north end on the west side is a little bay separating the Highclere from the Davis azaleas which is occupied by the Pinxterbloom or Honeysuckle azalea, *Rhododendron nudiflorum,* so named because it flowers before the leaves develop. Its blossoms are long slender tubes of pale to dark pink in clusters at the ends of the naked shoots, very sweetly scented. A native of the eastern seaboard from Massachusetts to North Carolina and west to Ohio, it is a very hardy azalea and one which follows the Vasey azalea into bloom. Other plantings of these will be found in Woodland Garden where they are now about five feet tall, and near Loderi Valley on Azalea Way.

Very similar in appearance to the Pinxterbloom azalea is *Rhododendron canescens,* the hoary azalea of more southern distribution, native throughout the southeastern states. It is one of those species which flowers as its leaves unfold, and has lighter colored flowers than the Pinxterbloom and a slightly later flowering period. The Arboretum's best group of the hoary azalea is at the west end of Loderi Valley where there are plants now five or more feet tall, planted ten years ago; other groups are in Woodland Garden and along Azalea Way south of Loderi Valley.

Coming into bloom about the same time is *Rhododendron roseum,* the Roseshell azalea, which has not really proved its worth with us as yet. A small planting of eighteen-inch plants flowered this spring in Woodland Garden, albeit rather shyly. The flowers are pink to rose, have a delicious clove fragrance, and appear along with the leaves. Others may be found in Loderi Valley, Woodland Garden, and Azalea Way.

Several of the mid-season native American azaleas have not been particularly showy during the past few years, either because they have not yet reached maturity, or because of a poor location. Among these are a small planting of *Rhododendron oblongifolium*

along Azalea Way, nine year old plants that have flowered very poorly for the past several years; *Rhododendron canadense,* the lovely Rhodora, which have been pining away for their cold damp north woods; *Rhododendron atlanticum,* a white or pink flowered azalea growing for us along Azalea Way south of Loderi Valley, still too young to put on a good display; *Rhododendron alabamense,* another white flowered azalea with a yellow eye which was still holding a few fragrant flowers in late May this year, but which has never really bloomed well either in Loderi Valley or along Azalea Way; and the yellow, reddish tinged *R. austrinum,* the Florida azalea, which was damaged severely by the November, 1955 freeze.

Late May or early June ushers in the best of the American azaleas, for show at least. These start with *Rhododendron speciosum,* the Oconee azalea of Georgia and South Carolina which is much better described by its synonym, *R. flammeum,* since the bank of Azalea Way at the west end of Loderi Valley truly flames with the brilliant Indian reds, oranges, and scarlets of the small almost spidery flowers carried at the ends of the bare branches like burning brands. No sooner do these change to dull embers than the fire is taken up by the Flame azalea, *R. calendulaceum,* of the central Atlantic states. These are among the most variable of all the native azaleas we grow, perhaps because the large numbers which are planted along Azalea Way and in Loderi Valley give an opportunity for variation, or perhaps because they are seedlings in large part and hence may be expected to vary. Vary they certainly do, in color from yellow to blazing scarlet, in flower from large single flowers to mops of small blossoms, and in habit from tall erect to low and spreading. One has but to examine the large bed of Flame azaleas at the foot of Loderi Valley in late May to realize how much one species may deviate from the typical.

The Flame azaleas remain in flower for nearly a month; toward the latter end of their reign the Western azalea takes over as queen of Azalea Way. *Rhododendron occidentale,* southern Oregon and California, grows into a large shrub; some of our older plants are eight or nine feet tall and nearly as much across, with fine glossy foliage and pale pink or white flowers, blessed with a most delicious fragrance. These are among the oldest of the American azaleas in the Arboretum, with large groups planted at the east and west end of Woodland Garden, on Azalea Way near the north end, and more or less all the way down to Rhododendron Glen. The Western azalea shows some variation in flower and fall foliage color but this is by no means as evident as the variation in the Flame azalea.

Rhododendron occidentale may still be showing a few late flowers in early July, but three easterners are left to finish the show. Of the three *Rhododendron Bakeri,* sometimes called *R. cumberlandense,* from the Cumberland plateau in eastern Kentucky, is the most brilliant, and usually celebrates the Fourth of July with a shower of orange to red blossoms. Our plants in Loderi Valley are still quite small, averaging only two or three feet, but they put on a handsome display for their size—perhaps because they come at a time when there are few other flowers to compete with them. Less brilliantly colored but with a scent so sweet as to perfume large areas of Azalea Way are two very similar white and pink late flowering species. *Rhododendron arborescens,* the sweet azalea, usually put out its flowers by late June or early July when the warm air can carry its wonderful heliotrope fragrance around. Our largest and oldest collection, planted before 1946, is mixed with its late flowering compatriot, *R. viscosum,* the swamp azalea. This is a very similar azalea differing in its lower, stoloniferous habit, and gland-covered flowers.

When the last flower has faded on these, the pageant started in late April has finished, but it has been a brilliant display for some three months, and best of all, we may look forward to an almost equal show of color from some of these same plants in October, for many, especially the Western and the Flame azaleas, give us some of our most striking banks of fall color.

The Educational Activities of the Montreal Botanical Garden

HENRY TEUSCHER*

NO botanical garden deserving of the name can possibly omit education from its program. It would have no reason to exist if it did, and it would surely be difficult to find another equally convincing justification for gathering large collections of living plants from all over the world and for maintaining them at public expense. Even to merely display these plants with identifying labels and to permit the public to view them serves education. Some botanical gardens start out in this simple fashion but experience in the maintenance and propagation of the various plants unavoidably accumulates, and the public, intrigued by the displays, requests information. This immediately broadens the educational activities of the garden. Some botanical gardens serve mainly higher education at university level, but any garden which obtains all or most of its support from public funds has to go much further because the public rightly and justly will demand it.

The Montreal Botanical Garden, which is owned and maintained by the City of Montreal, meaning that it depends entirely on public funds, has placed services to the public in the forefront from the very beginning. We have always taken the answering of inquiries and questions seriously and have gradually developed a special department of information including three people who do nothing else all day long but answer by phone, by letter or in person all the questions which are presented to them. Their telephones are ringing continuously and their mail often turns into a flood. To ease their work, we have prepared over 40 leaflets which answer the most commonly recurring questions on house plants, lawns, rock gardens, trees, shrubs, perennials, annuals, vegetables, etc. This service is widely appreciated and has contributed importantly to the popularity of our garden.

In addition, like other botanical gardens, we give several series of lectures on house plants, window boxes, Christmas decorations, etc. Because of over-heavy demands on our staff, caused by large scale construction work, these courses, unfortunately, have had to be omitted during the last year. In fact, we have never been able to go as far in the giving of public courses on gardening as we would like to because we have no special funds for this purpose.

In our city the schools are on a strictly separate financial basis and the administration is anxious to avoid creating a precedent by getting involved in the educational field. For this reason we have so far been unable to set up a separate staff for the giving of public courses. Eventually, this impasse will undoubtedly resolve itself in one way or another because with increasing leisure time of the population it becomes ever more impossible to keep recreation and education entirely separate.

One of our most successful educational activities has been our garden for school children where some 200 children from many different schools are instructed in the fundamentals of gardening. Each child has its own little plot and their work is supervised by a school teacher and a gardener (fig. 18). On public demand, similar gardens are now to be organized in various parks in other parts of the city, all being under our supervision. This, by the way, shows clearly where education and recreation merge. The gardening year starts in April when the children sow seeds of tomatoes, petunias, etc., in boxes in a greenhouse especially set aside for them.

During winter educational movies, mostly on natural history, are shown free every Saturday afternoon in our large lecture hall. These movies also are only for children and, though no comic strips are included and questions are asked afterwards by a teacher, a big crowd is always waiting for the next

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*Curator of the Montreal Botanical Garden since 1937.

show no matter how bad the weather. The film has to be repeated three or four times to accommodate all the eager children. A weekly TV program serves the adults.

Since the fall of 1957 we, furthermore, receive the 8th and 9th grades of all the French Catholic schools of the city for one half day, providing an introductory course in natural history. This is supplementary to the instruction given in the schools and serves mainly to arouse interest in this all-important subject by means of demonstrations on living subjects. Two classes of about 35 children each come together, so that some 70 children are taken care of in the forenoon and 70 in the afternoon. Altogether this program reaches every year some 450 school classes with over 15,000 children. After their return to school the children have to write an essay on what they have learned at the Botanical Garden and school credits are given for this visit. To this educational activity, the city administration cannot object because the salary of the teacher who gives these courses, and who actually was a school principal before he was delegated to us, is paid by the school commission. We only supply the lecture room with its equipment as well as the living plant material. During the summer months this same teacher is in charge of the school gardens. So far, unfortunately, we have been unable to persuade the English Protestant School Commission to make a similar arrangement but this will, undoubtedly, come eventually.

For the last 21 years we have, furthermore, conducted a school for apprentice gardeners which accommodates fifteen young men, 17 to 21 years of age. Five always graduate every year while five new ones are added. The practical work during the summer is

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Below:

Children's Garden at Montreal Botanical Garden

FIG. 18 PHOTO BY: MONTREAL BOTANICAL GARDEN

New or Unusual Plants in the Arboretum

J. A. Witt

8. *Magnolia cylindrica* Wilson

MAGNOLIAS are among the noblest of flowering trees which we may grow and proper selection of several species and hybrids will give the gardener a flowering season of some six or more months. Among the most showy are those belonging to the section *Buergeria* which include such well known species as *M. Kobus; M. salicifolia,* the willow leaf magnolia; *M. stellata,* the star magnolia; several hybrids among them such as *M. Proctoriana (stellata x salicifolia)* and *M. Loebneri (Kobus x stellata),* and two little known and rarely cultivated species, *M. Biondii* and *M. cylindrica.*

The members of the section are all native to Japan, Korea, and China, all are precocious in flowering, all have white or rarely pink flowers, and with the exception of the star magnolia, all are trees of varying sizes. Since these magnolias are at home in the cooler climates of N. E. Asia, they tend to be among the most hardy of the genus, and hence it was with considerable interest that we received a small plant of the almost unknown *M. cylindrica* from Mr. Fairman Furness, Upper Bank Nurseries, Media, Pa., in May, 1949.

The small plant flourished in a modest way, and was planted in a sunny bed just west of the main magnolia collection some four years later. Six more years passed, during which time the plant grew to a height of ten feet and received as a companion one of its own scions, grafted on *M. Kobus* stock in 1952 and planted in 1954, now about 7½ feet tall. In the winter of 1958-59 we noticed the mouse-gray furry buds that herald the flowers of this section of magnolias. This sent us scurrying to the library to find a description of the forthcoming flowers, but no amount of searching could disclose any information on them. This much we did learn; the species was first described by E. H. Wilson in 1927 *(Jour. Arn. Arb.,* VIII, (2), 109, (Apr. 1927)) from leaf material and fruiting specimens collected in Anhwei province of eastern China. Dr. Wilson recognized it as a new species closely allied to *M. Kobus,* which is Japanese and Korean in distribution, but could only speculate on the flowers. Other usually reliable references such as G. H. Johnstone's *Asiatic Magnolias in Cultivation* and Rehder's *Bibliography of Cultivated Trees and Shrubs* either gave it only passing mention or ignored it completely. A letter was sent post-haste to Mr. Furness asking for the history of the plant and for any information he might have about it. In his answer, Mr. Furness reported that he had flowered the plant in past years but didn't feel that it was of any special interest, and while similar to was not as good as *M. Kobus.* He received his plants from Mrs. J. Norman Henry of Gladwyne, Pa., who grew them from seeds she acquired from the Lu-Shan Botanic Garden, Kuling, China some time before World War II. Kuling is in Kiangsi Province, just south of Anhwei, so the seed source should be reasonably authentic.

About the last week of March 1959 our two plants of *Magnolia cylindrica* came into flower, and very pleasing they were too, with the large white blossoms setting erect on the ends of the slender leafless branches. Each flower was about four inches tall, composed of six obovate "petals" and three very small pale green "sepals" surrounding a green gynoecium and a crown of pink stained, creamy stamens. The flowers were quite chalice-shaped when young, but as they aged, the "petals" reflexed and finally spread into a very shallow cup. The manner in which the flowers sat at the end of the branches and their rather heavy texture reminded one of the Yulan magnolia *(M. denudata)* but the small "calyx", the shape of the "petals" and the delicious lemony fragrance recalled *M. Kobus.* In general the two small trees were better when in flower than the usual *M. Kobus* or *M. salicifolia,* and certainly with

their large erect flowers were as good as the best clones of those two related species (fig. 19).

Those of us engaged in horticultural botany have long since learned that "things are seldom what they seem" to quote Little Buttercup in *H.M.S. Pinafore*. We must check all plants to see that they are correctly named and our magnolia was no exception. Here we relied on vegetative characters since, as mentioned above, no description of the flowers was found, and our attempts to set fruit ended in failure. Alas—our magnolia doesn't fit with Dr. Wilson's *M. cylindrica* in leaf size, shape, or pubescence. At this writing herbarium specimens of our trees are being prepared so they may be checked against the authentic specimens at the Arnold Arboretum. It is quite possible that what we have may merely be a variant of the type, or it might even be a hybrid, but it certainly is different from any magnolia we are presently growing. Be it what it may, we accept it for its beauty of flower, sweet fragrance and neatness of foliage and welcome it as a new addition to our growing magnolia collection.

For those more botanically inclined, a brief technical description of our magnolia is appended below:

Habit: several stemmed small tree with widespreading branches; new shoots green, silky pubescent, second and third year branches purple brown, covered with short dense, appressed hairs.

Leaves: thin of texture, obovate-elliptic to rarely ovate, shortly acuminate or occasionally obtuse, cuneate at the base, 8-14 cm. long, 3½-4 cm. wide; petiole 10-12 mm. long, covered with short silvery appressed hairs; upper leaf surface dull green, somewhat reticulate with impressed veins, glabrous, lower surface glaucescent, sparingly strigose, the yellowish hairs somewhat thicker along the veins.

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Below:

Magnolia cylindrica, flowering for first time in Arboretum, April 2, 1959; flowers 4 in. high, white, fragrant.

FIG. 19 PHOTO BY: WM. ENG

Field Studies of the Garry Oak in Washington

THEO. H. SCHEFFER*

WE first came into this field of observation and research some forty years ago and have field notes and illustrations dating back at least thirty-six years, which should be long enough to evaluate the changes in ecology that have taken place in the region of this study.

The Species

From botanical records and the field journals of Douglas himself, we learn that the Garry oak *(Quercus Garryana)* was first described and named from specimens collected near old Fort Vancouver, Washington in 1826 by David Douglas, although it had earlier been found by Archibald Menzies on the Olympic Peninsula in 1792. This enthusiastic young botanist was among the first in the field in the Pacific Northwest. His herbarium material was sent, from time to time, to his former institution of training, the University of Glasgow in Scotland, there to be described by the eminent taxonomist, William Jackson Hooker.

This species of the western white oak is the only one native to Washington—the only one north of the Columbia river. It was named in honor of one Nicholas Garry, secretary of the Hudson's Bay Company.

Distribution

The Garry oak is native to our Pacific coast region from the Bay area at San Francisco northward into British Columbia. It also fingers around the Cascades in Washington to the east side in Skamania and Yakima counties but has its best distribution in the state, though always of scattered growth—never heavy—on the semi-arid Nisqually Plains where the terrain is mainly outwash from the glaciation of Puget Sound. Wherever found, the Garry oak seems well adapted to the drier and sometimes higher, more rugged situations. In the northern parts of its general range it becomes dwarfed at its upstate limits along the Chuckanut Drive near Bellingham and on a few of the San Juan Islands where it is sometimes referred to as Vine oak. Three small colonies of the Garry oak have been authenticated in British Columbia, one of these in the Victoria region. In Washington it does not occur east of Puget Sound between Bellingham and Tacoma.

Growth and Age

The Garry oak is a slow growing species in Washington and unable to compete with other trees in its range. The aggressive Douglas fir shades out the oak on its advancing front over the locally vanishing prairies. In the older fir groves one will find many oaks, trees and saplings, overtopped and strangled out by the more vigorous firs.

It is difficult to get at the exact age of the larger of these oaks except by ring count of cross sections and such are not readily obtained owing to the present scarcity of older trees. Resort to old logs fallen many years ago has its disadvantages in that the sapwood has usually rotted away in part and its ring count can be established only by comparison with that of smaller trees.

It may be said here that the use of an increment borer to determine the age of the oaks is not practicable, for the stem of the cutter will not stand the strain of the operation. Moreover, the growth of the larger trees is usually so eccentric that one cannot aim for the center of the growth rings which is necessary to make exact count. The wood is hard and heavy. A freshly cut block thrown into a pond usually will sink readily to the bottom.

The larger of these oaks as they now stand in the field are commonly the progenitors, each of a grove of its progeny gathered about its base Other such larger trees have probably been harvested by pioneers. These few big trees still left will have reached an age of at least 250 years. The largest of these, the Saint Martin's oak near Lacey, Washington, is about 600 years old according to our comparable ring counts. It bore acorns last year.

*Collaborator, U.S. Dept. of Agriculture; author of various articles in *Bulletin* since 1944.

Based on a study of some fifteen cross sections of this oak, we have arrived at a formula for estimating closely the age of seedling trees standing on the Nisqually plains; viz., multiply the diameter of the trees in inches, as taped over the bark, by eleven.

Terrain and Soils

The comparatively level stretch of country beginning just south of Tacoma and extending through Pierce and Thurston counties is locally known as the "Gravelly prairies"; more properly it is designated as the Nisqually plains. These plains are flanked on the east by the foothills of the Cascades and on the west by the Black Hills and other coast ranges.

The plains are transected by the Nisqually river coming down from the present active glacier of the same name on Mount Rainier. The borders of the sandy, gravelly terrain are strewn here and there with some of the smaller morainic rocks, often thinly carpeted by greyish lichens The soil structure itself is characterized by the United States Department of Agriculture as "somewhat excessively drained soils derived from loose glacial outwash, Nisqually loamy sand, Nisqually sand."

On the Yelm prairies, in the heart of the Nisqually plains, to Tacoma and on up the Sound northward, the winter rainfall will average from 36 to 40 inches. But on the outwash prairies the loose gravelly soil is "excessively drained" to below the plow level for sustaining roots of many species of plants. In general, the Garry oak can take it once it gets established. We noted recently a vigorous three-foot oak that has been uprooted by a storm of last November. Its proximate root structure had brought up with it more than a truck load of loose gravel and cobble stones.

Utility

The wood of the Garry oak has, in the larger trees, a large proportion of dark heart wood to the lighter colored sapwood and might be useful in industry if there were enough of it to warrant exploitation. But, unfortunately, such is not the case. We have made diligent inquiry of old established furniture manufacturers and cooperage firms without learning that either industry ever utilized the native oak. More recently, however, we have learned that two firms in Tacoma, dealing with hardwood products, have made a few purchases of native oak for use in their trade. From limited observation of the use of this oakwood, it appears that in texture and appearance it takes on a beautiful polish suitable for veneers or specialty pieces of furniture. Undoubtedly, the Hudson's Bay colonists and the early pioneers made considerable use of the oak for their fireplaces in barracks and homes. We have found that a Yule log of the native oak here will hold fire over-night.

Pests and Diseases

The native oak of Washington is notorious for the scant production of matured acorns. Casual observers in the field have reported

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Below:

Garry Oak. The cluster form of oak growth shown here is quite common on the Nisqually plains.

FIG. 20 PHOTO BY: THEO. S. SCHEFFER

Arboretum Plant Collections*
II—MAGNOLIAS

M. acuminata (L.) L. (1759) E. & C. U.S.A.
Cucumber tree.
H. Kohankie Nsy., Painesville, Ohio, (1940; pl.)
Arnold Arb., Boston, Mass., (1940; sd.)
From latter source, planted out 11/46, two trees flowered 5/52. Eventually becoming a very large tree and one of the least ornamental species. Fall leaf color pale yellow-brown.
Ht. 24-30 ft. Coll.**

M. Ashei Weatherby (1926) W. Florida
Morton Arb., Lisle, Ill., (1949; sd.)
A very interesting and rare small tree (to 15 feet), closely related to *M. macrophylla*, but with much smaller leaves and flowers; these also fragrant, white with purple spots at base. Planted out 11/55; first flowered mid-June, 1957. Ht. 6.5 ft.

M. Campbellii Hook fil. & Thoms. (1855)
E. Nepal to Assam.
Arnold Arb., Mass., (1942; pl.); Bonnell Nsy., Renton, Wash., (1944, pl.); D. G. Graham, Broadmoor, Seattle, (1948; 1951; sc.); Swiss Floral Nsy. Co., Portland, Ore., (1948; pl.); W. B. Clarke Nsy., San Jose, Cal., (1949; pl.); Prentice Nsy., Seattle, (1950; pl.); Mrs. P. D. MacBride, Woodinville, Wash., (1953; pl.); Taylor Nsy., Seattle, (1958; pl.)
Nine attempts have been made to establish this beautiful Himalayan tree here, but only the latest plant remains, now 6 ft. tall. The others succumbed to the abnormally early freeze of November 1955, when the largest was probably 10 ft. tall. This species flowered in at least one Seattle garden close to Puget Sound prior to that date. RG.

M. cordata Michx. (1803)
N. & S. Carolina, Georgia
(*M. acuminata* var. *cordata* Sarg. (1886))
Yellow flowered magnolia. Arnold Arb., Mass., (1940; sd.)
Closely related to *M. acuminata*, but smaller in size (25-30 ft. tall), more pubescent, the leaves somewhat smaller and blunter, flowers yellower and more conspicuous. Apparently only one tree now exists, in the Philadelphus collection east of Arb. Drive. Ht. 14 ft.

M. cylindrica Wils. (1927) Anhwei, E. China
Upper Bank Nsy., Media, Pa. (1949; pl.)
This small tree, 25-30 ft. in the wild state, related to the Japanese *M. salicifolia* but quite distinct in habit and foliage, flowered for the first time here, spring 1959. The flowers are borne upright on the branches, before the leaves appear, are fragrant, white in color. In ten years it has reached 11 ft. in height and proved perfectly hardy. Coll.

M. Dawsoniana Rehder & Wilson (1913)
W. China
Hillier & Sons, Winchester, England (1947; pl.); Veitch & Son, Exeter, England (1949; pl.); D. G. Graham, Seattle, Wash. (1951; sc.); Taylor Nsy., Seattle (1953; pl.); Prentice Nsy., Seattle (1956; pl.)
A tree of bushy form, up to 40 ft. high, evidently entirely hardy in the Seattle area but unlikely to flower until about 20 years old. Flowers large, pink in bud, white flushed pink when fully open. Its nearest relative is *M. Sargentiana*. The 1947 plant died in 1950; all the others survive. The 1953 plant is now 15 ft. tall; the largest of the 1951 scions, grafted on *M. acuminata*, is 10 ft. This is likely to be one of the hardiest Asiatic magnolia trees in the Puget Sound region. LV.

M. Delavayi Franchet (1889) S.W. China
W. B. Clarke & Co., San Jose, Cal. (1947, 1950, 1956; pl.)
An evergreen tree of spreading habit reaching 30-40 ft. in a suitable site, with large leathery dull green leaves and fragrant creamy white flowers, about 8 ins. diameter, opening from mid-July to September. Requires a sheltered, warm corner to succeed, being less hardy than *M. grandiflora*. The 1947 plant was killed in the winter of 1948; those of 1950 flowered in July 1953 and in 1954, but were frozen in November 1955. The third introduction was planted spring 1959. This species is easily propagated by summer cuttings under mist.
Ht. 3 ft. Coll.

M. denudata Desr. (1791) E. China
(*M. conspicua* Salis. (1806)) Yulan
K. Wada Nsy., Numazushi, Japan (1940; pl.)
D. G. Graham, Broadmoor, Seattle (1948; sc.)
One of the most beautiful of the race, eventually tree-like in size if not always in form, attaining 30 ft. or more in height and living to a century or longer. The pure white, fragrant flowers open here in April; seeds are rarely produced. Most plants, including the largest (about 18 ft. tall) were killed by cold, November 1955. The largest now is 14 ft. high.
Coll.

'Triumphant' See M. Soulangiana 'Triumphans'

M. Fraseri Walter (1788)
U.S.A.; Va. to Ga. and Ala.
Mountain magnolia
H. Kohankie Nsy., Painesville, Ohio (1940; pl.)
Arnold Arb., Jamaica Plain, Mass. (1940; sd.)
This near relative of the Umbrella magnolia (*M. tripetala*) is more arborescent in form, equally vigorous in growth, but very shy in producing flowers here; only in 1952 and again in May 1959. Flowers white, fragrant, petals 5-6 ins. in length; leaves 8-12 ins., with prominent auricles ("ears") at the base. Fall coloring dark tan to almost chocolate brown. Ht. of two trees, 23 ft. and 26 ft. Coll.

M. globosa Hook. fil. & Thoms. (1855)
Sikkim to N.W. Yunnan, China
W. J. Marchant, Wimborne, Dorset, England (1948; sd.)
R. Veitch & Son Nsy., Exeter, England (1949; pl.)

*The second list of plants of one genus cultivated here. For MAPLES see Fall and Winter issues, 1958.
**For abbreviations of locations see end of list.

G. H. Johnstone, Cornwall, England (1951; sd.)

A near relative of the Japanese *M. Sieboldii*, but possessing larger leaves and a tawny pubescence on the young shoots and underside of the foliage; flowers nodding, white, fragrant, May to June. The cold of Nov. 1955 killed all our plants outdoors. One small plant remains of the last introduction. Nsy.

M. grandiflora L. (1759)

U.S.A., N. Carolina to Florida & Texas

Bull Bay

W. P. Fulmer, Seattle (1938; pl.); K. Wada Nsy. Numazushi, Japan (1940; pl.); Kiyono Nsy., Semmes, Ala. (1940; pl.); Missouri Bot. Gdn., St. Louis, Mo. (1954; pl.)

This splendid evergreen tree can grow to considerable size and flower annually in and around Seattle, but a sunny sheltered location is advisable. Many of our plants were severely damaged by the freeze of Nov. 1955, a few killed. There is great variation amongst seedlings in habit, leaf form and color, flower qualities and other characters. The 1938 tree, now about 24 ft. tall, first flowered in 1958.

'Goliath'. A broad and blunt leaved form, said to be one of the finest for flower size and form. Planted 5/52. Ht. 5 ft.

'St. Mary's'. A seedling selected and propagated at the Glen St. Mary Nurseries in Florida, flowering at an early age. Planted 4/53. Ht. 7 ft.

M. Kobus D.C. (1818) Japan; Korea

K. Wada Nsy., Numazushi, Japan (1940; pl.); Mrs. C. M. Ballard, Seattle (1941; sd.); E. A. Fabi Nsy., Seattle, (1945; pl.); C. S. English, Jr., Seattle, (1947; pl.); B. A. Russell, Seattle, (1949; sd.); Morton Arb., Lisle, Ill. (1949; sd.)

The great variation amongst seedling trees of this species in flower production and quality strongly indicates that selection and vegetative propagation of the best forms should be practised by nurserymen. Some trees here are hardly worth the room they occupy, while the clone 'Wada's Memory' (see *Arb. Bull.*, XXII, (1), 20-21, (spring 1959)) is one of our loveliest flowering trees in early April.

Plants raised from seed have produced flowers nine years after sowing; some received as plants have taken as long or longer; the minimum has been nine years in both cases.

Ht. (of 1941 intro.) 14-24 ft., usually about 17 ft. (fig. 21). Coll.

var. borealis Sarg. (1908)

W. J. Marchant, Wimborne, England (1948; sd.)

(Continued on Page 104)

Below:

Dried leaves of species and hybrids of Magnolia, section *Buergeria,* growing in Arboretum. Top row, left to right, *M. Kobus, M. Loebneri* 'Willowwood', *M. Loebneri* 'Merrill', *M. salicifolia;* bottom row, l. to r., *M. salicifolia,* Frye form, *M. Proctoriana, M. stellata.*

FIG. 21 PHOTO BY: WM. ENG

The Arboretum Bulletin

VOL. XXII, NO. 3 SEATTLE, WASH. FALL, 1959

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To keep memberships in the Arboretum Foundation in good standing, dues should be paid during the month payable. Active memberships more than three months in arrears will be dropped and THE BULLETIN will be discontinued.

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The Arboretum Foundation,
University of Washington Arboretum
Seattle 5, Washington

I hereby apply for membership in the Arboretum Foundation and remittance for same is enclosed to cover dues for the next succeeding 12 months.

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All memberships are non-assessable.

Notes and Comment

On Saturday afternoon, July 4, the first tea ceremony was held in the newly completed and most attractive Japanese tea house, a gift to Seattle from the City of Tokyo, erected beside the pond in the Arboretum west of Lake Washington Boulevard and south of Interlaken Boulevard.

The traditional and fascinating ceremony was conducted by Grand Master Sashitsu Sen of the Ura Senke School in Kyoto, assisted by Prof. Sohei Nagai. Guests taking part were Mrs. Gordon S. Clinton, wife of the mayor of Seattle; Mrs. Yoshihara Takeno, wife of the Japanese Consul-General; Mrs. Prentice Bloedel and Mrs. Kyomi Otani. A descriptive commentary was given by Mrs. Iku Matsumoto to an appreciative audience composed of Arboretum Foundation Directors and interested members of the public.

We hope that this ceremony may be repeated again in the future on appropriate occasions in our tea house.

There will be an exhibit of branches of cone-bearing trees, and of trees and shrubs with fall color or fruits in the Arboretum clubhouse, Saturday and Sunday, October 17 and 18, 1959, from 10 a.m. to 5 p.m. each day.

As this is an unusually productive season for cones of all kinds in this region, this exhibit should be of exceptional variety and interest. Members of the Arboretum staff will be in attendance each day to answer questions.

Amongst numerous out-of-state and some overseas visitors this summer we were particularly pleased to welcome Mr. V. van Straelen, President of the National Parks of the Congo; Mr. K. Mizuno, Director of the Higashiyama Botanical Garden, Nagoya, Japan; Dr. E. McClintock of the California Academy of Sciences, San Francisco; Mr. P. C. Everett, Superintendent of the Rancho Santa Ana Botanic Garden, Claremont, California, and Mr. K. Wada, of Hakoneya Nurseries, near Yokohama, Japan.

As the Winter issue of the *Bulletin* will coincide with the 25th anniversary of the founding of the Arboretum, a marked departure will be made from our usual type of contents in order to emphasize the development of the Arboretum and the extent of its varied work and services.

Amongst them will be historical notes on the Arboretum and its growth through these years; the uses and value of the Arboretum to the city, the University and others; the Foundation, its Units and activities; new plants introduced and distributed; birds found in the Arboretum, more comparative photographs of the changing scene, etc.

In the subsequent spring and following issues in 1960 we will republish portions of some of the most interesting and valuable articles from our earlier numbers, thus bringing back some of this excellent material to our readers' notice. A small committee has been at work on this task of selection for the past three months.

THANK YOU!
THANK YOU!

To all the

DRIVERS
HOSTESSES
CASHIERS
ERRAND BOYS
TICKET SELLERS
RESEARCHERS
TROUBLE SHOOTERS
POST POUNDERS
Etc. . . . . .

The Committee for the Town and Country Garden Tours is most grateful for your help in making the tours a great success.

DR. JOHN H. HANLEY

On August 14, 1959, Dr. John H. Hanley, second Director of the Arboretum, died suddenly in Seattle at the age of 55.

Having earned a master's degree in horticulture and a Ph.D. in plant physiology at the University of Illinois he was appointed Director of the Arboretum at a crucial time of planning and development, which included the propagation and planting of thousands of young trees and shrubs along Azalea Way, in Rhododendron Glen and many other places.

In addition to administering and supervising the daily work and progress of the Arboretum Dr. Hanley contributed frequently to the small monthly *Bulletin* published by the Arboretum Foundation and in March 1942 became editor of the enlarged issue which a year later blossomed into a quarterly journal. Much time and effort was also devoted to promoting and publicising the work and aims of the Arboretum, as well as the growing of essential vegetables during the war, by means of radio and personal talks to garden clubs and a variety of other groups, thus laying a strong foundation for the greatly increased activities of the post-war years and bringing the Arboretum, its capabilities and possibilities, constantly before the people of Seattle and the Puget Sound area.

On resigning his position January 31, 1947 he turned to horticultural journalism, to radio and then to TV programs in the same profession, working for private industry and in recent months for certain members of the Washington State Nurserymen's Association.

An arboretum grows and develops through the thoughts and labors of succeeding generations of skilled men, especially if supported by an appreciative and enlightened citizenry. Towards this end John Hanley contributed his full powers for eight difficult years and will be remembered in the future as one of the prime builders of a notable institution of its kind. The writer will particularly remember his many kindnesses during early years in a strange land and forever regret that such a fine tree should have been felled when in its prime.

B.O.M.

ARBORETUM NOTEBOOK

This section is particularly designed for notes, information and queries concerning beautiful or unusual plants from growers of all types or experience. We solicit your remarks and ideas, but space limitations may sometimes restrict us to publishing those of the widest interest.

OCTOBER, 1959

"What a virtue patience is in a garden and how great a reward."

Kniphofia blooms from June to October and makes a fine show late into the fall. The new hybrids are splendid with low and high, almost fantastic, flaming spire-like blooms. A background of shrubs sets them off to perfection. They may be propagated by seeds or division of the stocky roots in spring and they prefer a deep, rich soil in full sunshine. In autumn the leaves may be tied together to keep the rain from the crowns. They make a fine show in the autumn garden when other plants are beginning to droop. They are often called "red-hot pokers" and also by the now discarded name of Tritoma.

Try stretching a ribbon of heather, "H. E. Beale", back of the fall-blooming gentians. The soft pink of the heather with the brilliant blue of *G. Macaulayi* and *G. sino-ornata* makes a remarkable harmony.

It would be good judgment when choosing rhododendrons to keep in mind the winter foliage. Many of the newer varieties, while they may have massive blooms, are only beautiful while blossoming. The rest of the year the foliage is poor and structure of the bush may not be pleasing. To improve the appearance of established plantings our own Salal *(Gaultheria Shallon)* and Oregon Grape *(Mahonia)* should be considered to plant with them. *M. Bealei* is an outstanding variety of the latter family. It has long racemes of scented, pale-yellow blooms and large, bluish-green, thick, stiff leaves, a fine contrast to the bright green foliage of rhododendrons.

There are many places on house walls where vines are an around-the-year pleasure. Even if they do not have evergreen leaves they form an interesting decoration. The fragrant jasmine *(J. officinale)* and yellow flowered, winter blooming *Jasminum nudiflorum,* both with greenish stems, make unusual puzzle patterns on the walls. They are interesting back of a narrow border where they can be studied at close range.

Several years ago I saw at a flower show in San Francisco an evening primrose that I coveted more than any plant I had seen in years. It had clear, bright, rose-pink blossoms about one and one half inches across and was sweet scented. It was labeled *Oenothera speciosa* var. *rosea*. I finally found the grower and he said they were easily grown in a mixed border or a shrub border. They were perfectly hardy, blooming throughout the summer. I grew them for several seasons but never with the great abandon they had in California. I commend them to anyone with a sunny garden who would like an unusual, breath-taking beauty and hope seed may be found.

NOVEMBER

"They shall beat their swords into plough shares and their spears into pruning hooks." Isaiah.

There is little reason to find gloom or a dismal garden in November and through the winter when we can grow so many shrubs with berries and autumn fruits to add to our garden's value and beauty. The splendid hips of *Rosa Moyesii* and the spindles of Euonymus alone make a garden sing. *Euonymus europaea* has insignificant flowers but the daring combination of magenta and orange in the berries adds to the fall garden and is a boon to all flower arrangers. This variety also has glowing red foliage in the fall. Added to these are the Vacciniums, from little *V. Vitis-Idaea,* the Cow-berry of Britain, to *V. corymbosum* usually four to five feet high, considered by some the best of the family. This is the swamp blue-berry of eastern North America.

The popular myth that a full-berried year portends a hard winter is difficult to tuck away with old legends but all those gardeners who keep a garden note-book question the fallibility of this belief.

The gallant winter-flowering cherry, *Prunus subhirtella* var. *autumnalis,* is strangely variable in many ways. Habitually it begins to flower in October after the leaves have fallen and continues through November and December and then again—in a burst—in spring. The flowers are semi-double and stemless in autumn but in spring they dangle on a short stem. The tree may, in time, reach twenty to thirty feet, with a spreading habit. In my garden it was planted with a background of native evergreens. Now I have it planted in a south exposure, close against my living-room window. It gives me a certain desired privacy and shade in summer. The foliage is small and pleasing and the blooms in fall and spring are especially welcome. Its Japanese name is Jugatsu-Sakura.

DECEMBER 1959

"Before you put this little book away
Please promise me that you will never say
You should have seen my garden yesterday."
Reginal Arkell in *"Green Fingers"*

"Everybody can grow winter honeysuckle out of doors. It isn't orchidaceous and it doesn't look as if it had been delivered from Bond Street in tissue paper, but it is a gilt-edged security from the middle of December to the end of February It has demurely pretty flowers in great abundance, and its fragrance is as intoxicating as freesias or tuberoses."

Beverly Nichols in *My Garden,* Dec. 1934.

Lonicera fragrantissima that Mr. Nichols extols grew along the driveway in my garden. On a cold, sunny day its fragrant welcome as we drove home was something to anticipate.

Stranvaesia glaucescens comes from the Khasia Hills in India. It is said to be named for the Hon. W. Fox-Strangways F.R.S. It belongs to the Rose family. The flowers are like Hawthorn blooms but the fall fruits are an unusual orange-yellow.

The name Skimmia comes from the Japanese Skimmi and means poisonous fruit.

Of all the irises, to me the most appealing is *Iris japonica*. The blooms, seldom more than one and one-half inches across with frilled edges, open almost flat on branching stems. They are an exquisite lavender-white with orange and deep violet ornaments. Generally the first blooms open in March and it continues blooming for six weeks or more. It is a rhizomatous iris with vivid green leaves growing on fan-shaped branches. In sunny spots in well-drained, light soil it asks for nothing more and spreads indefinitely but not obtrusively. "Poor man's orchid" is the living name it has known for years. This is not a December note but it may remind one to look for this treasure and add it to your list of fall orders.

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"Maples Cultivated in the United States and Canada"

by Brian O. Mulligan, *Director*

University of Washington Arboretum
SEATTLE, WASHINGTON

List with data regarding geographical distribution, classification, arboretum plantings, propagation, etc.
American Association of
Botanical Gardens and Arboretums

Copies may be obtained at $2.00 each from

CARL W. FENNINGER, Secretary
P.O. Box 216, Lima
Delaware County, Pa.

BOOK REVIEWS

The Orchids, A Scientific Summary. Carl L. Withner, Editor; Ronald Press Co., New York. Price $14.00.

THIS is a very comprehensive and scientific work on all phases of orchidology. It is highly technical for the most part, so it is doubtful whether it would be of much help to the beginner grower, or the amateur with a few plants, but for those who are beyond the beginner stage, and are interested in pursuing the subject further, it would be of great interest.

Each of the 14 chapters is written by an authority on the particular subject covered, and full bibliographies are given. A few of the subjects covered are: Introduction and History of Orchid Culture; Classification of Orchids; Embryology and Development in the Orchidaceae; Orchid Physiology; Orchid Pests and their control, and a number of others. There is a very interesting chapter on the commercial cultivation of vanilla, in all sections of the tropics. One of the appendices contains a very long list of chromosome numbers, which would be of interest to the advanced hybridizer.

There are a few photographs, but most of the illustrations are line drawings, mainly anatomical. Altogether, a very worthwhile book.

L.E.B.

Tree Maintenance by P. P. Pirone, third edition, 483 pp., illus., Oxford University Press, New York, 1959. $10.00.

THIS book was originally published in 1941 as *Maintenance of Shade and Ornamental Trees,* and was revised in 1948. The third edition is in reality a new book rather than a new edition, as it has been completely rewritten and contains a great deal of new material and new illustrations. During the eighteen years since the first edition was published many changes have occurred in the field of tree maintenance and Dr. Pirone has attempted to incorporate these in the third edition.

The author has given a very good description of the book in the preface in which he states, "Nearly twenty years have passed since I wrote the first edition of this book on tree maintenance. In that period great changes have occurred in the field of arboriculture. Not only have more effective pesticides been developed, but also more efficient machines to apply them. And new machinery for feeding, transporting, and pruning trees has since been introduced. Our whole concept of feeding trees has also changed, as is evidenced by the present widespread interest in foliage feeding. Perhaps the most unusual development in the last twenty years has been the change in our views of what constitutes an ideal street side or lawn tree. This is emphasized in Chapter 8, where I have relegated such old standbys as oaks, elms, and planes to secondary parts and have cast the so-called small or low growing trees in the leading role."

The book is divided into two parts. Part I deals with general maintenance practices. In this he discusses such things as soil and its relation to trees, transplanting trees, fertilizers and their use, pruning trees and tree wounds, cavity treatments, bracing and cabling, and trees suitable for various locations. His discussion of fertilizers and their use should be of particular interest to the home owner who is interested in keeping his trees in the best growing condition possible.

Part II deals with "Specific Abnormalities of Trees." The first chapter in this section deals with methods of diagnosing tree troubles. This is followed by a discussion of non-parasitic injuries, insect control, spraying equipment and practices, tree diseases and their control, and general parasitic diseases. The last three chapters deal with diseases and insect pests of specific trees, grouped into three classes, namely low growing trees, tall growing trees and evergreen trees. Unfortunately, most of the trees listed in these three sections are not found in the northwest. However, with close observation on the part of the home owner, the diagnosis of trouble and the controls can be applied to our trees.

To those of you who would like to know the monetary value of your shade or ornamental trees, a method of evaluating shade trees will be found in the appendix. This information has been taken verbatim from the booklet *Shade Tree Evaluation,* published by the National Shade Tree Conference and the National Arborist Association in July 1957 at Wooster, Ohio. For those who would like additional information on particular phases covered in the book there is an excellent bibliography of some four hundred references which should be most helpful. The bibliographies support and supplement the material presented chapter by chapter.

The book is well written, easily understood, and will be found useful both to the home owner and the professional arboriculturist.

GORDON D. MARCKWORTH, Dean
College of Forestry,
University of Washington

"The Arboretums and Botanical Gardens of North America." Compiled by Donald Wyman. (Arnold Arboretum of Harvard University, Jamaica Plain 30, Mass., May 1959). Price $1.50.*

THIS is a revision of a descriptive list first written by Dr. Wyman and published in "Chronica Botanica" in 1947. Both in size (6x9 inches) and number of pages (69) it has shrunk from the original list, but the number of institutions included has risen from 90 to 109, of which all but ten are located in the United States; Canada accounts for seven, Cuba two and Mexico one. Listing is alphabetically by states and cities.

For each entry details are included of address, area, date of establishment, chief functions (to which most space is allotted), features, ownership, staff, operating budget, publications, etc.

Sixteen half-page photographs illustrate Botanical Gardens or Arboretums in many parts of the United States, including Seattle; a two page map shows their locations and the hardiness zone in which they are situated.

At the end of the work, prior to the index, is a list by states of some 48 gardens not included in the main catalogue for different reasons.

This is an essential and most valuable publication for all those interested in such establishments, whether local or distant, and what plants are likely to be found there. If a similar list was available for Europe we should all be much wiser on the subject than we are at present. Dr. Wyman must be thanked once again for revising his original list for our benefit.

B.O.M.

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*Copies are available in the Arboretum office.

"Trees in Towns" by R. J. Morling. The Estates Gazette Ltd., London, England (1954). Price seven shillings and sixpence.

"TREES IN TOWNS" is a comprehensive though simply written guide to growing and maintaining trees under modern city conditions. England has revered its woods and individual trees since before the fabled days of Sherwood Forest. The intricate laws pertaining to trees, particularly the Tree Preservation Orders under the various Planning Acts quoted, indicate the years of effort required to preserve the English trees in the face of modern city expansion, estate divisions and growing industrialization. We ourselves are too close to the original forests to realize that trees are no longer merely obstacles to progress and that we will soon require similar efforts of preservation in our cities.

We have made a start with our official lists of suitable trees for property owners to plant in their parking strips and have tardily begun the planting of shade trees along our downtown streets. Less has been done to force removal of undesirable trees which heave our sidewalks, or shrubs which block views of driveways and street intersections. The recent mushrooming of small apartment houses in residential districts and widening of streets through these districts are quickly destroying the former charm by uncontrolled tree cutting. Our city park departments could well study Chapter IV and the legal efforts required to protect and replant trees "in the interest of amenity" on their streets, neighborhoods and parks. During this present rush of constructing freeways, our highway engineers should take to heart the contents of Chapter VI. We talk of traffic safety yet neglect the plantings which often can help reduce accidents. Furthermore it is shown how the proper choice of trees can minimize the necessarily huge maintenance on such big projects.

The suggested plant lists for various uses and effects are excellent, although there are a number of varieties not generally available locally. The brief botanical discussion of trees is expressed in the simplest terms. The warnings of the dangers of trees, the listing of tree uses for different conditions, the description of the legal aspects of trees, all form an easily understood picture of trees in our modern urban community. This little book should be required reading for all landscape architects in both private and government practice, as well as for our multitude of tree admirers.

NOBLE HOGGSON

"Wild Flowers of Santa Barbara Region" by Katherine K. Muller. Santa Barbara Botanic Garden Inc., Santa Barbara, California. Price $1.00.

THE Santa Barbara Botanic Garden is located adjacent to the city of Santa Barbara and Dr. Muller is the Director.

Forty-five beautiful native flowers are illustrated in color in the booklet, with a brief description and botanical classification of each.

On the page opposite the introduction are drawings giving the botanical names of the parts of a typical flower in order to help the layman understand the scientific descriptions of the plants following.

The California poppy is featured on both front and back covers of the booklet giving it a gay and colorful appearance. The character of the terrain is illustrated on the front cover. The flowers are depicted by Campbell Grant in beautiful and accurate color and the descriptions in clear and concise language. Many of these plants, both herbaceous and woody, can be grown successfully in our own gardens. To name only a few:

The Matilija poppy *(Romneya Coulteri)*, Indian paint brush *(Castilleja Douglasii)*, baby blue eyes *(Nemophila Menziesii)*, shooting stars and Mariposa lilies.

Many of the shrubs can be used in our gardens if given adequate protection in winter, e.g. *Fremontia californica, Ceanothus spinosus,* and many more.

This charming little booklet is an addition to any flower lover's library and certainly will prove useful to those visiting Southern California.

M.R.T.

The Seattle Garden Club Lake Washington Ship Canal Planting Project

(Continued from Page 77)

Some of the plant material we are using: European white birch, mountain ash, *Prunus cerasifera atropurpurea (Pissardii), Cedrus Deodara,* Lombardy poplars, vine maples, sumacs, *Ilex crenata,* potentilla, azaleas, veronicas, moonlight broom *(Cytisus praecox),* kinnikinnick *(Arctostaphylos Uva-ursi),* and hypericum.

We are hoping to have a show of financial support within the next few months since it will lessen costs tremendously if we can be assured of being able to develop the entire plan at one time.*

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*(Income tax deductible checks should be made out to Seattle Garden Club, Lake Washington Ship Canal Planting Project, and mailed to Mrs. Caspar W. Clarke, The Highlands, Seattle 77.)

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The Educational Activities of the Montreal Botanical Garden

(Continued from Page 85)

supplemented by theoretical courses during winter. The teaching is done mostly by members of our staff who receive an extra pay of $10.00 per hour for this work. The students, instead of paying a fee, receive a wage approximately equivalent to that of an unskilled laborer. This program was undertaken because thoroughly trained gardeners, outside of European immigrants, were unavailable here, while we as well as the City Park Department were increasingly in need of gardeners. Throughout the years this school has served us well, and not only do we have quite a number of the graduates on our staff but some of them occupy well paid positions elsewhere or are in business for themselves. At present this school is in a transition period. The wages of the students which in the beginning were only nominal have been boosted too high in proportion to the free services extended to them. This came about because they joined a labor union and by doing so they have come close to "killing the goose which laid the golden egg." The city administration, which has always had misgivings about our running a school, though it actually served the city, is quite rightly angered by the wage situation and wants to have the school closed. We hate to give it up but we cannot deny that the city has just cause. Besides, the quickly progressing development of our garden which now includes nine large conservatories, 28 service greenhouses and 200 acres of park space, places an increasingly heavy burden on our permanent staff. The teaching schedule, though it operates mainly during winter, is becoming too heavy for them. To carry on the school we would have to employ teachers which the city would never permit us to do. Negotiations are now under way with the provincial government for special funds with which to run a vocational school. If this succeeds, and at present it

looks as if it might, the school will be reorganized on an entirely different basis which will solve all our present troubles. These details are given here because they show how a simple and altogether utilitarian undertaking may grow and be sidetracked until it gets beyond control.

Under educational activities must also be included prearranged conducted tours through the garden for which we employ university students during the long summer vacations. The labelling of the plants throughout the garden, often providing additional information besides the name, as well as the grouping of the plants in special gardens such as the flower garden of annuals, the display garden of perennials, the garden of economic plants, the fruit garden, the medicinal garden, the rock garden, the alpinum, the arboretum, the fruticetum, the water and bog garden, the hedge garden and the lawn and turf garden also serve educational purposes.

New and Unusual Plants in the Arboretum

(Continued from Page 87)

Flowers: white, carried erect at the ends of the shoots, about 9-10 cm. tall; tepals 9, 3 sepal-like, small, 1½-2 cm. long, long acuminate, greenish white; 6 petal-like, these of the outer whorl about 9 cm. long, obovate-spatulate tapering gradually to the base, rounded to emarginate at the apex, white stained pink at the base; inner three very similar but slightly smaller in all dimensions; gynoecium green, 2-2½ cm. tall; stamens many, stained faintly pink; pedicels green, silky pubescent, short. Fruit not seen. Flowers late March to early April, before the leaves.

Postscript—Dr. Burdette Wagenknecht of Arnold Arboretum has just written confirming the identity of our magnolia as *M. cylindrica,* and further stating that they have not yet been successful in growing this plant at Jamaica Plain, Mass.—an indication that it may not be as hardy as some of its relatives.

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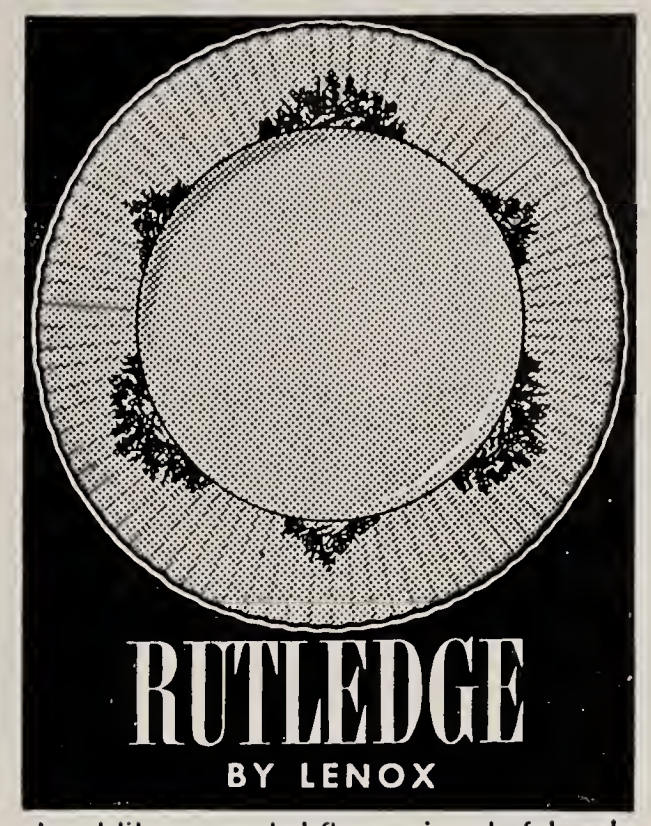

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Plant Introduction by the Arnold Arboretum

(Continued from Page 76)

— 'Innocence' 1932
— 'Norma' 1925
— 'Rosace' 1905
Picea asperata 1910
— *glauca* 'Conica' 1904
— *Omorika* 1881
Potentilla fruticosa 'Jackman's Variety' .. 1956
— — 'Katherine Dykes' 1951
— — 'Moonlight' 1951
Prunus 'Hally Jolivette' 1941
— *Sargentii* 1890
— *subhirtella* 1912
— *yedoensis* 1902
Pyracantha 'Kazan' 1951
Rehderodendron macrocarpum 1932
Rhododendron mucronulatum 1888
— *obtusum Kaempferi* 1892
— *Schlippenbachii* 1905
— *yedoense poukhanense* 1905
Robinia Holdtii 1925
Rosa calocarpa 1925
— *canina inermis* 1925
— *Hugonis* 1908
— *Moyesii* 'Geranium' 1952
— — 'Sealing Wax' 1951
— — 'Underway' 1952
— *pomifera* 'Duplex' 1898
— *pteragonis* 'Redwing' 1951
— *Wichuraiana* 1888
Salix caprea 'Pendula' 1900
— *Matsudana* 'Tortuosa' 1923
Sorbus aucuparia xanthocarpa 1925
— *decora* 'Nana' 1957
Spiraea arguta 'Compacta' 1951
— *Bumalda* 'Crispa' 1936
Staphylea holocarpa rosea 1908
Symphoricarpos Chenaultii 'Erecta' 1952
— 'Magic Berry' 1956
Syringa Tigerstedtii 1949
Viburnum cassinoides 'Nanum' 1934
— *fragrans* 'Compactum' 1937
—*rhytidophyllum* 1907
Weigela 'Boskoop Glory' 1957

Longwood Gardens—USDA Plant Introduction Program

(Continued from Page 73)

whether they want to or not, have to think about frost tolerance in their sub-tropical woody ornamentals.

During the period September 1958 through February 1959 a fourth exploration was conducted in Australia by Mr. George Spalding of the Los Angeles State and County Arboretum, who served in a temporary capacity as USDA horticulturist. Australian wildflowers are famed for their showiness and unusual forms, but have yet to become well-known in cultivation in America. Requiring for the most part a Mediterranean-type of climate of wet winters and dry summers, these introductions from "Down Under" should fare best in southern California where they will be initially tested at the Los Angeles State and County Arboretum (fig. 15). Some, like the more familiar acacias, make worthwhile subjects for conservatory culture and newly introduced species of this group will benefit, of course, institutions like Longwood Gardens which maintain outstanding conservatory displays of exotic ornamentals.

A fifth exploration to West European countries was started in July 1959. Undertaken, as was the second, by Dr. Meyer, it will continue the sort of work initiated by him in 1957 in southern Europe.

Although a number of the new plant immigrants resulting from this Longwood Gardens-USDA program are already showing promise as useful ornamentals, it is still too early to be able to report definitely on how they will do in America. Several seasons are normally required to increase the introduced plant material, which is often represented at time of entry by only a few seeds or even a single cutting. Certain restricted materials may be delayed a season or more in post-entry quarantine. After increase of new stock is effected, the USDA distributes immigrant material to cooperators for evaluation. Eventually the choicest introductions will stand out among all brought in. They may serve only as outstanding additions to the collections of botanic gardens or arboreta. On the other hand, if they meet the approval of the general public, they should become available through nurserymen or seed dealers and thus eventually find their place as new ornamentals which will bring greater variety into the gardens of America.

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Field Studies of the Garry Oak In Washington

(Continued from Page 89)

that they have never seen any acorns worthwhile. In fact, some who have given more serious attention to the matter have concluded that the Garry oak is sterile in its more northern limits. In our own research, we have found no such condition where an older and more mature tree could be located.

In a study of acorn production beginning in May of last year (1958), we set up a series of ten collecting stations in a circuit of perhaps 20 miles on the Nisqually plains when the oak trees were blossoming and putting forth their leaves and therefore giving promise of fruitage. All ten stations provided at least a few acorns throughout the summer and fall, though in some cases the acorns at maturity were not viable by reason of insect infestation. There are two common offenders in this pest class; a weevil, *Curculio uniformis,* and the so-called "filbert worm", larvae of a moth, *Melissopus latiferreanus.* The latter pest infests the acorn earlier in the fruiting season and emerges sooner in the fall to pupate in a cocoon of nearby shelter. The weevil later drops to the ground and digs in to pupate.

The only disease we have observed to affect the trunk of mature oak is a fungus that is known as oak heart rot, *Stereum frustulosum* Pursh. This disease appears to usually affect only the more overmature trees, causing decay of the heartwood extending up the interior of the trunk for several feet and sometimes disclosing a hollow at the base. Enclosing this hollow may be a shell of live sapwood perhaps several inches in thickness. Eventually, the tree will fall from rotting at the root structure. Old logs of the type thus prostrate may be found in former oak stands. Heart rot also affects some of the larger branches of the older trees causing them to break off and drop to the ground.

Reproduction and Development

All oaks spring from an acorn originally, of course, but there are many considerations of interest and value between the acorn and the tree. Fairly common occurrence of the Garry oak on the Nisqually plains is presently displayed by a large, older oak surrounded by a grove of its progeny perhaps an acre or more in extent. Such a grove will show seedlings a few feet high up to mature acorn-bearing trees as much as 20 inches in diameter and considerably more than 100 years old. Planting of these groves may be accounted for by their proximity to the parent tree.

The occurrence of small to moderate-sized oaks scattered here and there over the prairies can be accounted for only by crediting help of birds and smaller rodents in this operation. We have here two species of field mice which are known to cache food supplies in the soil or duff. Then we have also the little red squirrel which carries and caches both nuts and fir cones. But the large grey squirrel has been the most active agent in distributing the acorns. They carry the nuts further from local shelter than the other rodent ilk. These squirrels were quite common in our earlier observations but are becoming scarcer now by reason of hunting pressure. From a check of herbarium records and museum collections of mammals, we find that the grey squirrel occurred wherever there were oaks and where there were no oaks—there were no grey squirrels in southwestern Washington.

Of the bird carriers known to distribute the acorns, two deserve special mention—the Steller jay and the bandtailed pigeon. The jays are normally present about the oaks but we have not observed them caching acorns anywhere. They do drop the acorns in flight however which serves the purpose of oak planting. We did not see the bandtailed pigeons about the oaks last fall, but in the autumn of 1956 they were present in such large numbers as to indicate habitual resort to our larger trees.

A spot cache of acorns on the prairies may result in what we know as cluster oaks—several practically divergent saplings grown to tree size. More often, however, this cluster type of oak trees is due to crown sprouting

from a rootstalk as it were, where the former growth has been destroyed once or repeatedly by browsing animals or by grass fires. In such cases the cluster units will be of different sizes, while if they are all of the same size the cluster may have resulted from a multiple cache of nuts (fig. 20).

The individual oaks in a clump make more rapid growth than the isolated seedling trees, being already with sustaining roots and rootstock structures of crown. We have a seedling specimen 7 feet high and one inch in diameter which has a growth ring count of 22; another 15 feet high and 3¾ inches in diameter has a count of 49 growth rings which, with pith addition, will make this sapling more than 50 years old. These two seedling oaks both grew under average conditions at the edge of a grove. Again, cross sections of 8-inch clump oak trunks will have but 44 growth rings.

Present Status

Considering the odds against it—of reduced prairie range, increased browsing by domestic animals and scant cooperation in planting by birds and small rodents—the Garry oak seems to be losing out on the Nisqually plains, region of its most successful earlier domain. With the extension of the large military and maneuvering grounds of Fort Lewis which now occupy many square miles of the prairies and the construction of new freeways slashing into the few remaining stands of the oak, it is unwise to predict what will happen to these oaks.

On the other hand, when protected by man in suburban and country home districts the native oaks are gaining ground, especially about the many small prairie lakes.

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Arboretum Plant Collections
II Magnolias

(Continued from Page 91)

This northern variety, capable of reaching 90 feet in its native home, and said to possess larger leaves, flowers and fruits, has not yet been identified here among our young trees. 'Wada's Memory' seems to come closest to it. A plant raised from this English source flowered in 1957.
Ht. 12 ft. Coll.

M. liliflora Desrouss. (1791) China
Kiyono Nsy., Semmes, Ala. (1940; pl.); Layritz Nsy., Victoria, B. C. (1947; pl.); Dr. L. L. McCoy, Seattle (1950; pl.); Mr. A. F. Hull, Seattle (1953; pl.)
Now well established and completely hardy here, this is one of the most dependable and free-flowering species, particularly for smaller gardens. Flowering season, mid-April to early May.
Ht. (of 1940 pl.) 7-8 feet Coll.
'Gracilis' (var. *gracilis* (Salisb.) Rehd.)
W. B. Clarke Nsy., San Jose, Cal. (1956; pl.)
'Nigra' (var. *nigra* (Nichols.) Rehd.)
Kiyono Nsy., Semmes, Ala. (1940; pl.)
Flowers darker purple than type
Ht. 7 feet Coll.

M. Loebneri Kache (1920)
Hybrid produced at Dresden, Germany; first flowered 1917. *(M. stellata* x *M. Kobus)*
'Willowwood'. Nat. gdn. origin in N. J., about 1941
Dr. B. Blackburn, Gladstone, N. J. (1955; sc.)
Described by the donor and illustrated in *The Gdn. Jour.* (N. Y. Bot. Gdn.), 2, (2), 43-44, (March 1952). Three young trees planted Nov. 1955. Ht. 3-4 ft. Coll.
'Merrill'. Hybrid made at Arnold Arb., Mass., 1939; first flowered 1944.
Arnold Arboretum, Jamaica Plain, Mass. (1954; sc.)
Evidently a very handsome form of this hybrid, judging from photographs of the flowers in *Arnoldia,* XII, (6), 47, (May 1952). One tree planted March 1959 (fig. 21).
Ht. 4.5 ft.

M. macrophylla Michx. (1803) S.E. U.S.A.
Large-leaved magnolia
H. Kohankie Nsy., Painesville, Ohio (1940; pl.); Arnold Arboretum, Boston, Mass. (1940; sd.)
Unquestionably the most striking and conspicuous deciduous species grown here, for its very large leaves and conspicuous fragrant white flowers in June, but requiring shelter from wind and space to develop. For a southern tree it is remarkably hardy, never having been damaged here by cold weather, but the branches are somewhat brittle and apt to be broken by strong winds when in leaf.
Ht. 25 ft. (both introductions) RG & Coll.

M. mollicomata W. W. Smith (1920)
S.E. Tibet to S.W. China
(*M. Campbellii* sub-sp. *mollicomata* (W. W. Sm.) Johnstone (1955))
Hillier & Sons Nsy., Winchester, England (1947; pl.)
Little success has attended our efforts to introduce this beautiful tree, chiefly due to the cold winters of Jan. 1950 and Nov. 1955. One plant remains after being killed to the ground and growing up again.
Ht. 5.5 feet RG
M. mollicomata x M. Campbellii
D. G. Graham, Seattle (1951, 1952; sc.)
This hybrid, raised in England, appears to be about as hardy as *M. mollicomata.* A plant set out March 1954 was frozen to the ground Nov. 1955 but is now growing vigorously.
Ht. (of 1952 intro.) 10 ft. LV

M. nitida W. W. Sm. (1920)
S.W. China, N.E. Burma, S.E. Tibet
D. W. Stryker, Langlois, Oregon (1945; pl.)
An evergreen tree in its native home but usually of bushy habit (up to 25 ft.) in cultivation in S.W. England, this rare and interesting species is represented here by a small plant growing in a pot in the greenhouse. Its hardiness outdoors remains to be tested.

M. obovata Thunb. (1794) Japan
(*M. hypoleuca* Sieb. & Zucc.)
K. Wada Nsy. Numazushi, Japan (1940; pl.); Layritz Nsy., Victoria, B. C. (1947; pl.); D. G. Graham, Seattle (1951; sd.)
No plants from the first importation appear to have survived. By Sept. 1958 one of the second had attained 18 feet and flowered May-June 1959. This is eventually a tall tree, with large, handsome foliage changing to dark tan color in fall and very fragrant, cup-shaped creamy white flowers. It is not suitable for the small garden.
Ht. 18 ft. LV; Azalea Way.

M. officinalis Rehd. & Wils. (1913) E. China
Roy Bot. Gdn., Kew, England (1951; sd.)
A very close and similar relative of *M. obovata,* differing chiefly in details of foliage and fruit. One young tree planted Nov. 1956, another April 1959.
Ht. (of latter) 7 ft. Coll.

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M. Proctoriana Rehd. (1939) Nat. hybrid raised at Arnold Arb., Mass., 1929, between *M. salicifolia* and *M. stellata*

Carl S. English, Jr., Seattle (1946, 1951; sc.) Forming a small tree of upright habit, flowering like its parents in April before the leaves appear, the blooms white and fragrant, the foliage smaller than that of *M. salicifolia*, this plant has considerable promise for gardens of all sizes in this region. Scions received Jan. 1951 produced flowers April 1954. Ht. (of 1946 intro.), 14 ft. Coll.

M. salicifolia (Sieb. & Zucc.) Maxim. (1872) Japan

Willow-leaved magnolia

Armstrong Nsy., Ontario, Calif., (1945; pl.); Mrs. T. C. Frye, Seattle, (1947; pl.); C. S. English, Jr., Seattle, (1947; sd.; 1949; pl.)

This also is an attractive, hardy, early spring flowering tree, capable of reaching 30 ft. or more in height under good conditions. The habit is generally upright, making it very suitable for planting in restricted areas, along boulevards or to form avenues; the wood and leaves smell of anise when broken. Like its near relative, *M. Kobus*, there is considerable variation in floral and other characters amongst seedlings; the best forms should be propagated by summer cuttings or by grafting in early spring.

The Frye plant, now 14 ft. tall, possessing larger leaves and flowers (segments about ins. long, 1 in. wide) is superior to all others here. Those from 1947 seeds are now 10-12 ft.; a plant of 1949 is 13 ft. tall (fig. 21). Coll.

M. Sargentiana Rehd. & Wils. (1913) W. China

Mrs. R. Gick, Eugene, Oregon, (1956; pl.)

A tall tree, nearly related to *M. Dawsoniana* from the same region, less closely to the magnificent Himalayan *M. Campbellii*, and like them requiring 18-20 years or more from seed to flowering. The flowers, produced late in March or early April before the leaves, are rose pink outside, white within, up to 8 ins. diameter. A plant set out in April 1956 is now 8 ft. tall. RG.

var. **robusta** Rehd. & Wils. (1913) W. Szechuan, W. China

D. G. Graham, Seattle, (1951, 1952; sc.); Taylor Nsy., Seattle, (1952, 1958; pl.); Hagen Nsy., Arcadia, California (1953; pl.)

An even more handsome, bushier tree than the last, and perhaps a distinct species; the nodding flowers are larger (10-12 ins. diam., fragrant, especially at night, of a richer rose-purple hue. In England it has been brought to flowering in 14 or 15 years from seeds. Our largest specimen, planted 4/53, is now 12.5 ft. tall; a plant grown from the 1951 scions is 7.5 ft. LV; RG.

M. Schiedeana Schlecht. (1864) Mexico

F. G. Meyer, Missouri Bot. Gdn., St. Louis, Mo. (1948; sd.)

An evergreen tree of large size in its native home, belonging to the same group as *M. grandiflora* and having creamy white flowers. The seeds were collected at about 4,500 ft. in the mountains of N-E. Mexico, which perhaps explains why it survived the 1955 freeze here. Growth, however, has been extremely slow. Ht. 5 ft. Coll.

M. Sieboldii K. Koch (1853)

Japan; Korea; Manchuria; Anhwei, E. China (*M. parviflora* Sieb. & Zucc.)

W. J. Marchant, Wimborne, England, (1947; sd.); C. S. English, Jr., Seattle, Wash. (1947; sd.); Dr. B. Blackburn, Gladstone, N. J. (1953; pl.)

One of the small but horticulturally valuable section *Oyama*, all of Asiatic origin, shrubby in habit, flowering in late spring or early summer with the leaves, in autumn developing pendent cones of seeds.

In this species the leaves are obovate, the flowers white, nodding or horizontal, fragrant, from late May to early July; the long flowering season is an unusual character and asset. Ht. of oldest, unrecorded plant, 11 ft. Coll.

The following magnolia species or hybrids are also dealt with in similar manner in a subsequent issue: *M. sinensis; M. Soulangiana* (and 11 garden forms); *M. sellata; M. tripetala; M. Veitchii; M. virginiana; M. virginiana x M. grandiflora; M. Watsonii,* and *M. Wilsonii.*

Abbreviations for locations in Arboretum

Coll. In main collection by Arboretum Drive North, chiefly on west side of road.

LV Loderi Valley, immediately north of last area.

Nsy In nursery.

RG Rhododendron Glen, chiefly on south bank.

(To be continued)

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An Evaluation of Our Eastern Azaleas

(Continued from Page 81)

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